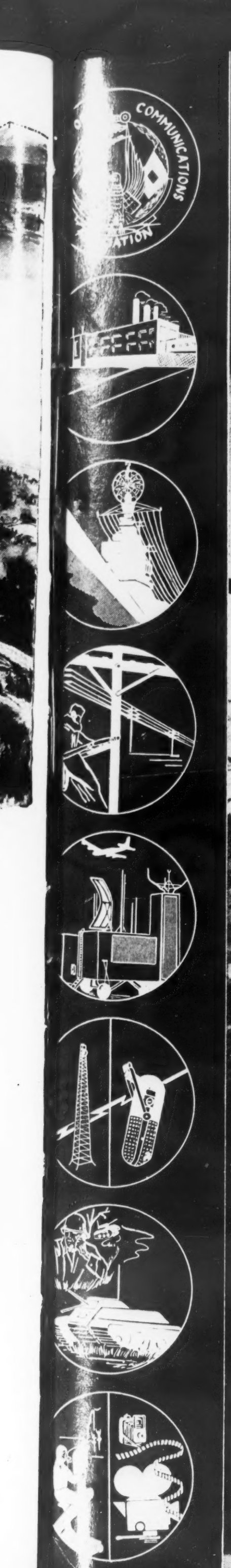

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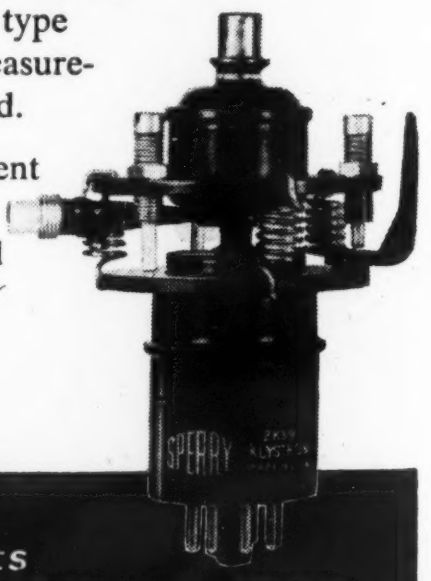

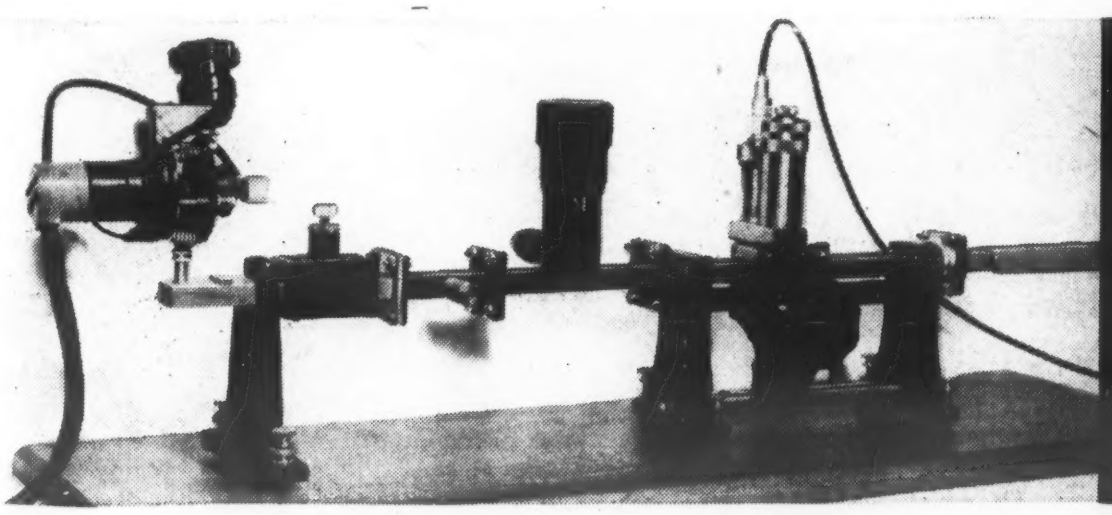

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2K 41 (WITH TUNER)	2660 -3310 mc	250 mw
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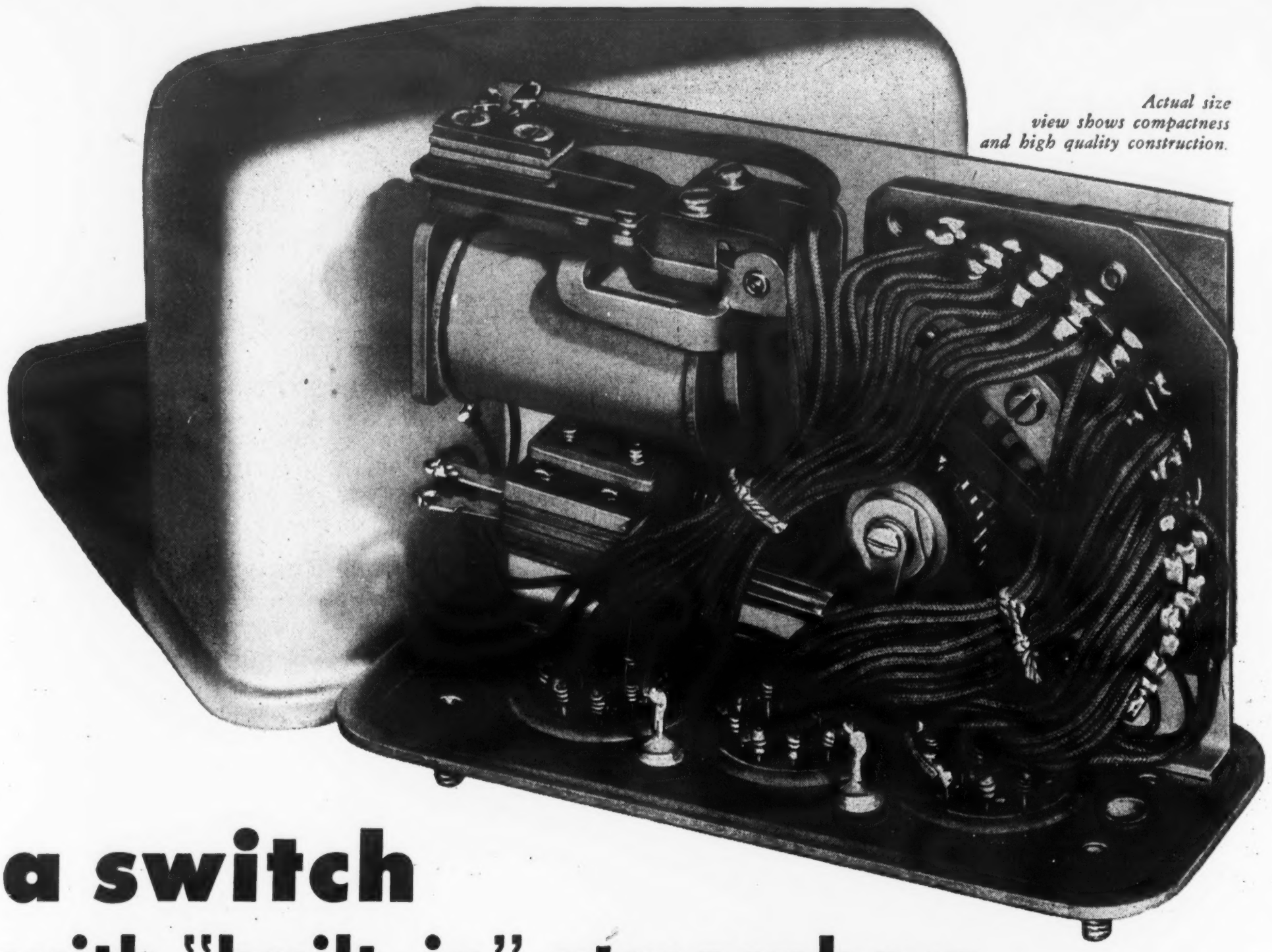

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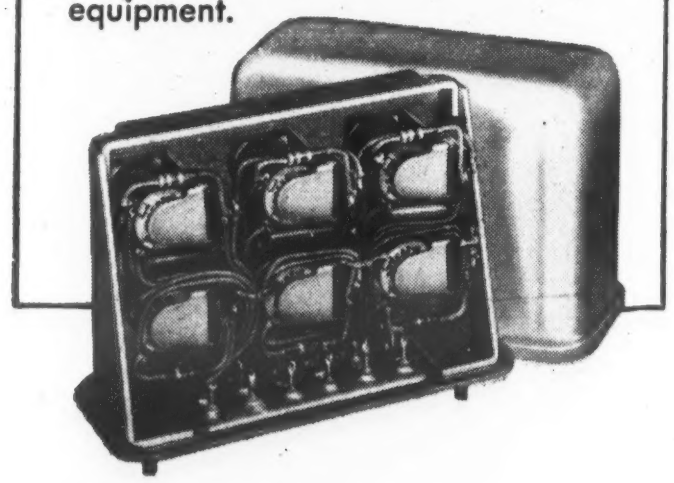

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SIGNAL

Communications-Electronics-Photography

Journal of the Armed Forces Communications Association

VOLUME 6 MARCH-APRIL 1952 NUMBER 4

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COVER

The cover for this issue pictures Independence Hall in Philadelphia, to remind AFCA members that the Association will hold its 1952 national annual meeting in that city. The dates are April 24-25-26.

SIGNAL is published bi-monthly by the Armed Forces Communications Association at 1624 Eye St., N. W., Washington 6, D. C. Entered as Second-class matter at Post Office, Washington, D. C., September 6, 1946, under Act of March 3, 1879. Additional entry at Baltimore, Md.

Subscription rates: 1 year (6 issues), $5.00. To foreign post offices, $6.00.

Printed in U.S.A. by Monumental Printing Co. at Baltimore, Md.

The publisher assumes no responsibility for return of unsolicited manuscripts or art. Authors are responsible for opinions expressed in articles.

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A page from the note-book of Sylvania Research

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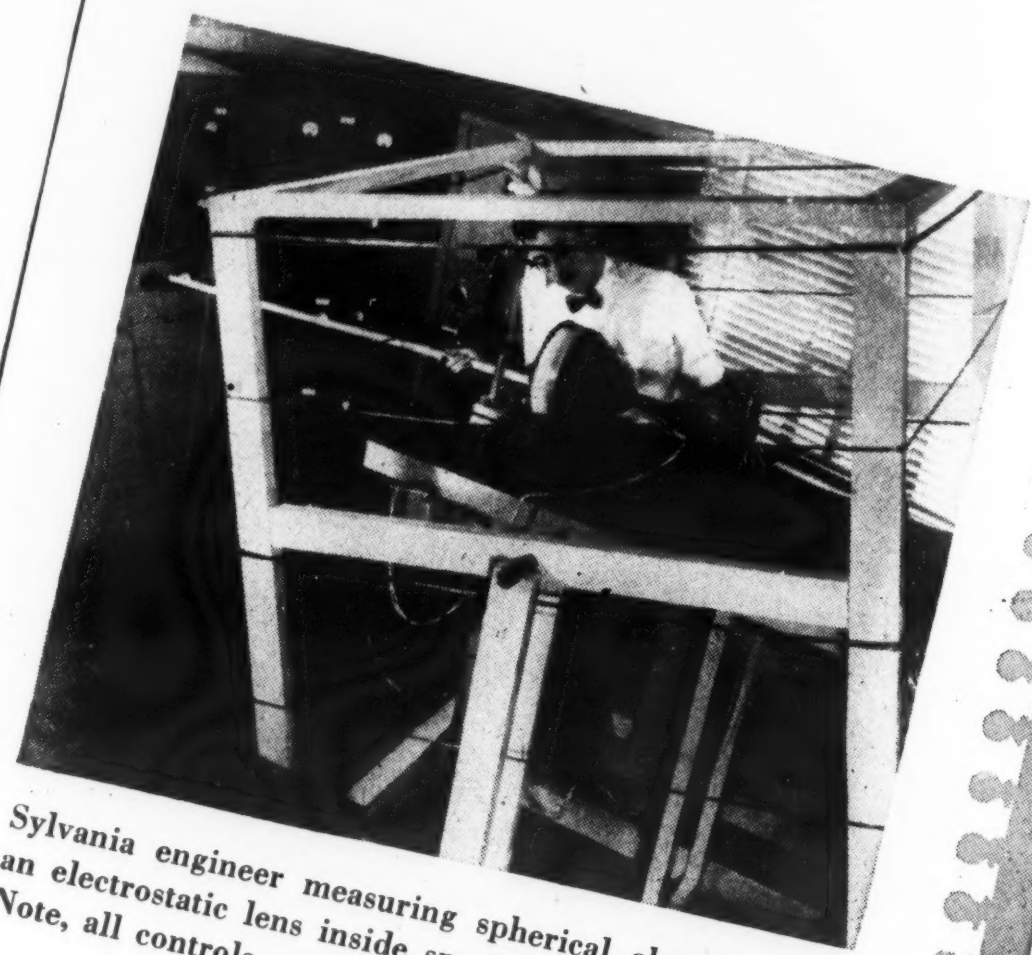

Sylvania engineer measuring spherical aberration of an electrostatic lens inside special Sylvania-built coil. Note, all controls are outside the coil.

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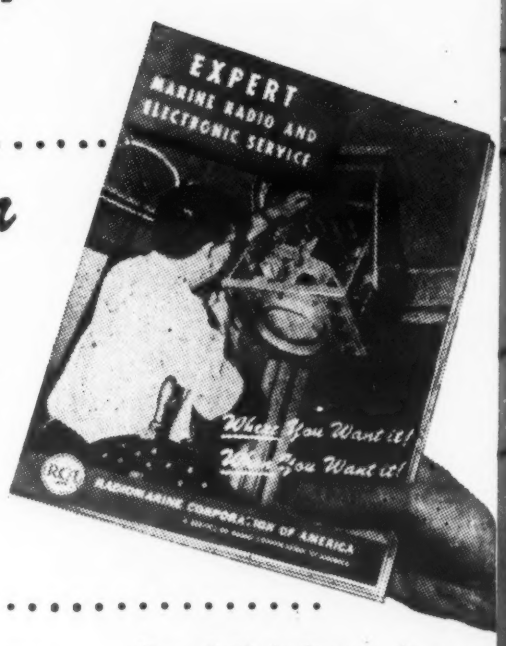

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Signal Corps
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Production
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CAMP GORDON

A few miles from Augusta, halfway along the Georgia-South Carolina border running from North Carolina southeast to the Atlantic Coast lies Camp Gordon, the U. S. Army Signal Corps' biggest manpower factory. Since its establishment, only three and a half years ago, its schools have produced by the thousands the radio operators, the radiotelegraphers, the teletypists, the switchboard operators, the telephone and cable installers, the electronics experts who man the far-flung, incredibly complex, and critically "nervous system" of today's armed forces.

Established originally as an adjunct to the physically limited signal school at Fort Monmouth, N. J., the Signal Corps Training Center at Camp Gordon has mushroomed in its mere three and a half years from the use of a handful of buildings and founding cadre into a vast installation spread out over 55,000 pine-forested acres and containing 2100 buildings. In its short life it has already turned out over 20,000 signal specailists, and under pressure of personnel requirements in the U. S. quasi state of war is training men at a still increasing pace.

Though Camp Gordon in its present function is among the youngest of U. S. miltiary installations, its name, and its site as a military post are as old as World War I. The Camp Gordon of that period, however, was located near Atlanta, and the site of the present Camp Gordon was then occupied by Camp Hancock. During World War II the post on the Augusta site was reactivated as Camp Gordon, developing during that war into one of the Army's largest training establishments.

When it was one of the larger Army posts in the second world war period, Camp Gordon had receded to a low level of activity when an advance party arrived on November 1, 1948, to organize the Signal Corps Training Center and establish its headquarters. The preparations proceeded rapidly, and there soon followed the setting up of The Southeastern Signal School (TSES) and the Training Units (TUTG), subordinate organizations of the Center. Just one month later the first contingent of students reported to begin their schooling.

The Center quickly grew in complexity as well as in size, and bit by bit more functions were assigned to it. TSES, for example, was given the mission of training individuals in Signal Corps specialties. For greater efficiency in housekeeping to take care of the needs of 5,000 students (capacity is now 7,000) a special regiment was set up into which the students are organized while attending school. This, the Signal Training Regiment, is actually a giant dormitory which houses, clothes, and feeds its residents—permitting the school staff to concentrate wholly on student technical instruction.

As a result of the outbreak of hostilities in Korea and the sudden influx of men into the Army, the Signal Corps Replacement Training Center was established in September, 1950, as the third major activity of the SCTC. This unit receives men fresh from civilian life, gives them their basic Army training, offers courses in pole line construction, message center and teletypewriter operation. Three principal components comprise the replacement center; the Basic Training Group, Technical Training Group, and the Leader's School.

Every week several hundred men from reception centers all over the country pour into the Basic Training Group to take their eight-week basic military training. In a huge, well-equipped training area they proceed through 400 hours of instruction in military fundamentals, combat skills, and weapons. Close-bordering their barracks area are the many special training sites for mines and booby traps, bayonet practice, grenade ranges, gas chamber, hasty fortifications, etc. Through the sprawling woodlands beyond, basics work out problems in patrolling, bivouac, march and signalling. The BTG is designed as a "cellular"

unit—capable of immediate expansion in an allout emergency.

The Technical Training Group gives eight-week courses in telephone installation, pole line, signal storage, teletypewriter operation, switchboard operation, and signal message clerk. Group instructor and class structure are patterned on the larger TSESS framework. TTG administers only the "short term" courses, as opposed to the "long term," highly specialized TSESS courses. Students here come from basic training and upon completion of courses proceed to units as replacements.

The Leader's School, established in June 1951, offers the first leader's course in Signal Corps history. Here small groups of select enlisted men undergo eight gruelling weeks of the sternest kind of military training. Students are put to extreme mental and physical tests to develop in them the highest possible standards of man-to-man leadership. Numerous leader graduates have gone on to Signal Corps OCS.

One of the most interesting sections of the Signal Corps Training Center is the Unit Training Group. This component plays a distinctive role in the Center, for whereas all other groups train individuals, UTG trains teams and units. The bulk of these teams and units are Reserve and National Guard outfits which have recently been called back into service. Filler troops are received to augment the trained men recalled, and team training programs are conducted to teach the men to work together at their Signal Corps jobs as teams, rather than individual specialists, and to generally prepare them for combat conditions. UTG guides units from their inception to final movement, directing every phase of training short of actual maneuver—basic military, advanced individual and branch, and for every type of signal company to corps. It is also empowered to conduct a specialist training branch, giving technical instruction to unit members.

But while all units include technical instruction to some degree, the main branch for this instruction at the Center is the Southeastern Signal School. It is much the largest and the most complex branch, its specific concern being to train men in the installation, operation, and maintenance of Army signal communications. Its courses are all highly technical, vary in length from ten to twenty-five weeks, and include radio repair, radio operation, cryptography, power equipment maintenance, telephone installation repair, repeater-carrier, and manual central office maintenance. The School's vast physical plant features latest equipment of every description, and hundreds of demonstrator models and training aids of its own design. The faculty is a combined civilian-military specialist unit numbering about 775.

The Chief Signal Office, Maj. Gen. George I. Back, recently visited and inspected Camp Gordon.

Main telephone and teletypewriter frame at "One Hundredth Army" Hq. "Army" is unit set up at Camp Gordon for field training in simulated combat conditions.

Student operators at bank of TC-10 switchboards, the Army's largest standard model. Students spend hours here as climax of course, serving as practice callers, operators, and receivers.

Top Instructor Staff

The Southeastern Signal School has an instructor staff to rival most colleges. They instruct in all phases, general subjects division, communications operator division, wire division, and electronics division. Many of the instructors are Civil Service appointees with previous teaching experience and military service, and the utilization of these qualified civilian instructors releases many men for active overseas duty. A glance at a cross section of the staff shows such backgrounds as these:

• Among seven civilian instructors in the electronics division are Theodore K. Conlon and Raymond Cauble. They have Master of Science degrees in physics. A little more than a year at Camp Gordon, Conlon heads the radio section. His specialty of nuclear physics, or as he puts it—"spectroscopy," ends the radio repairman's study. He feels that instructing the variety of students common to Army schools — students ranging in education from elementary school to college graduates—keeps the instructor on his toes, ready to answer any kind of question that might come up. Conlon taught first year physics at the University of Georgia. He served five years as a tech sergeant in the Army and during World War II saw action in the Battle of the Bulge with the 17th Airborne Division.

A supervisor at headquarters of the electronics division, Cauble completed his M.S. at Clemson, and while in at-

CAMP GORDON
The SCTC
And Its Components

The Signal Corps Training Center, a Class II Activity under the control of the Chief Signal Officer, is commanded by Brig. Gen. Robert A. Willard, USA. A veteran of 33 years service and two world wars, Gen. Willard entered Berlin in 1945 with the Allied Airborne Army and served as signal officer of the Berlin Sector for two years. He was made commander of the Berlin Garrison and Military Post and served in that capacity throughout the crucial siege of Berlin and the celebrated airlift, "Operation Vittles." He assumed command of SCTC upon his return to this country in 1949.

Three components comprise the SCTC. They and their functions are:

The Southeastern Signal School, main branch of technical instruction.

The Signal Corps Replacement Training Center.*

The Unit Training Group, trains teams and units, rather than individuals, including Reserve and National Guard units called to active duty.

***The SCRTC also breaks down to three components. They and their functions are:**

The Basic Training Group, receives men from reception centers and gives them their Army basic training.

Technical Training Group, gives short term courses to basic trainees.

Leader's School. Gives select men special training to develop leadership.

"Going down the line" on a pole line construction problem during a class at SCRTC. Man in foreground is instructor, men up the poles are students.

"Pole line orchard" gets a going over by new class of students. Two men in center foreground are instructor and student.

tendance there taught commercial school mathematics, radio, and physics.

He also notes the wide range of education in Army students and finds the main problem to be one of reaching the happy medium — keeping college students interested, but not at the same time going over the heads of those who have less educational experience. He was a sergeant in the Air Force during World War II.

Another example of instructor at the signal school is George A. Wall, ex-Navy and Coast Guardsman, who is teaching radio repair. He has the distinction of having his first radio-telephone license signed in 1919 by Herbert Hoover, then Secretary of Commerce. Wall recently joined the civilian teaching staff at TSESS, following several years of instructing civilian classes in Pensacola, Florida, vocational vschools. Wall sees little difference in teaching Army and Navy men, regarding them as learning equally well. He served ten years in the Coast Guard and three years in the Navy as a chief radioman.

Raymond E. Chandler, also a chief radioman in the Navy, retired after 20 years' service, has been at Camp Gordon for two years, serving as instruc-

Students in pole line construction course pull wire off drum of power driven wire reel. In foreground students use hand brake to control possible backlash.

supervisory work for the radio teletypetor in radio teletypewriter and doing writer school.

A comparative newcomer to the staff of TSESS is Harold E. Knight, University of Georgia graduate in physics. He taught physics at Georgia while completing his degree. Knight spent 13 months during World War II with the Signal Corps in pole line and cable splicing work.

For Robert A. Thompson a switch was made, when he joined the signal school faculty, from teaching high school English at Augusta's Richmond Academy to principles of electricity for the Army. Electricity is Thompson's hobby, although he graduated from the University of Georgia in English. He, too, is a Navy veteran, having served for two years on an air-sea rescue ship in the South Pacific.

Students come to TSESS from sev-

ROTC Summer Encampment To Be Held At Camp Gordon

Camp Gordon has been designated this year for the annual summer Signal Corps ROTC encampment, the first time any Signal Corps installation other than Fort Monmouth has been utilized for the ROTC summer camp. The rapid growth of the Signal Corps ROTC in U. S. colleges has brought the yearly encampment to a size beyond Fort Monmouth's accommodations. That Camp Gordon has the capacity to handle the greatly increased ROTC movement is one indication of how that installation has outgrown its "parent," Fort Monmouth.

An estimated 1200 ROTC cadets from colleges all over the country will report to the Signal Corps Training Center for the camp in mid-June. The six-week encampment will have three instructional phases—individual training, team and unit training, and finally practical applicaton of the lessons learned. Arrangements for the ROTC summer session were begun March 15 at Camp Gordon by a special planning group.

Assignment team from 301st Signal Photo Co., Camp Gordon, hurries from company orderly room to cover a job as part of team training operations.

eral sources; most of them assigned as they complete basic training, and before joining their field units. High-aptitude students from every type of unit attend the school branches, some from units which are in need of specialists, and some are sent by foreign governments. The school has graduated signalmen from the armed forces of Canada, Turkey, Israel, and South Korea. U. S. graduates are not limited to Army personnel, but include men of the Navy, Marines, and Air Force. All who finish the course of rigid, 45-hour, lecture-packed class weeks, advance to appropriate units.

While the curriculum at the Southeastern Signal School extends to the profound studies of electronics, the mainstays in Signal Corps operations are wire and radio communications and the enormous warehousing required for the vast supply and distribution system of the Corps. There will be no attempt to describe in any detail the courses of these divisions at the school, but the utilization by each of the sections of certain training devices is of interest and is briefly outlined—the use of tape recorders in radio schooling, indoor telephone poles and other gadgets in telephone instruction, and a model warehouse building for storage classes.

Training aids of the school's own design, mentioned earlier, include the interesting desk size "warehouse planning demonstrator," invented by Lt. Robert A. Algarotti, plans and training officer, 990th Signal Operations Company of the Unit Training Group. Used to train warehouse personnel, the demonstrator is constructed on a 24" x 48" plywood "floor", and can be made to duplicate any warehouse building on the post. Thorough in every detail, it can match window for window, door for door (either single or double), partition for partition, down to the "office space" and fire aisles. Blocks cut to proper measurements are used to duplicate property and equipment to be placed on the warehouse floor.

Final training of a Signal Corps telephone man at Camp Gordan runs the gamut from stringing wires to assigning telephone numbers. Even a scrawny tree, teaching practical use of a "tree guard," plays an important part in the telephone installer-repairman school. Trainees learn installation of seven types of telephones in a subcourse on substation installation (SSI) which takes up 68 hours of the eight-week course.

A. A. Murdock, civilian instructor in SSI, points out, "Everything is done to make the course as real as possible. Practical application and individual training is the highpoint. Of the 68 hours, only 11 are handled in conference. Remainder of the time is spent in practical work."

In the subcourse each individual is given a progress test, where he will string all lines from an outdoor pole into a building, connect with a terminal box, install the phone and assign it a telephone number.

When the student has completed installation of the phone he is checked out on a switchboard and graded. Mistakes are always pointed out so the trainee knows exactly what errors he has made.

Only two or three students out of the average class of twenty will be concerned with the tree. The tree guard which they learn the use of, in connection with the tree, is a three-foot plastic rod which houses the wire where it passes among the tree limbs, protecting it from moving branches stirred up by wind.

Homemade Training Aids

Instruction in the subcourse takes place in a room filled with training aids built by personnel and students of SSI. Typical training aids are stub telephone poles sunk in the cement floor; terminal boxes mounted on wooden walls for practice on wiring into buildings; boards showing splices, telephone types and methods of attaching a telephone line to a house, and means of wiring telephone for single or party-line operation.

Pride of the course is a nine-foot movable telephone pole, complete to cables, insulators, terminal box, drop lines, and cross arms.

Instructor Murdock, who has been teaching at Camp Gordon almost from its opening, explains that many techni-

New students of TSESS study the television demonstrator cutaway in demonstrator building's exhibition and conference room.

This board teaches trainees key or control wiring in substation installation phase of telephone installer-repairman course.

Students of radio operator course, TSESS, use a small field transmitter-receiver set during field problem.

Checking tubes in FM phase of radio repair course. Course qualifies graduates as radio repairmen MOS 3648.

Students in radio operators course practice receiving code under field conditions using vehicular set SCR 694.

cal phases of telephone installation are taught trainees in preceding subcourses, but all they have learned is combined with additional instruction in SSI.

Following SSI orientation, where trainees see a complete telephone installation, students learn six new types of splices and many variations. They are taught uses of these splices and what situations call for particular types of splices. Next phases of the subcourse teaches the trainee use of the drop wire, used to approach a building, and wiring into the terminal box at the foot of the pole.

As his instruction progresses, the future telephone man learns to work with lines around buildings and is taught the use of protectors which guard both equipment and personnel against high current and voltage. The student learns to use wire around corners and jutting edges of buildings.

An important part of the instruction covers seven types of phones used by the Army. All types are displayed and differences pointed out. Phones differ slightly in wiring and shape of stock, but each one is designed for a special situation.

Ten hours are then spent by the trainee to incorporate what he has learned into a full installation. This is a preview of the progress test, where he finds his weak points and is given a chance to correct them.

Further instruction and application teaches the student wiring of a phone. operation for party-line reception and actual installation. He has previously been taught the system of ringing for party lines.

Grand finale of the course is held in another building, known as P.T. building, short for progress test. The trainee is given a work order asking for installation of a phone. He must list the supplies he will need. Then he climbs one of the ten poles surrounding the P.T. building and drops a line to the building itself.

The P.T. building is reserved for this work, because it is necessary to drill holes through the walls for the wires. Wires are then passed through the holes and wired up to the terminal box inside, which the trainee has installed himself. He wires the phone in, assigns it a telephone number and checks out with the central switchboard. Once he has completed the installation he will dismantle it and compare notes with his instructor who will grade him, explaining any errors he may have made, and suggesting corrections.

Classes average 20 men in size, though there have been extremes ranging from 9 to 40 men, says Murdock. More time is available for practical work when less than 20 are in the class, he points out, and more than 30 presents a problem.

Training in pole climbing is of course an important phase of the student's telephone education. Each student spends 21 hours mastering the art of pole climbing, starting on poles only ten feet high and working up to heights of 30 and 35 feet.

To increase their confidence students spin around atop the poles playing catch with softballs. This helps them feel at ease, and you can't do too much to bolster confidence for men who may be hanging in the air some day with bullets flying around. But it's hard on the poles.

After completion of trouble-shooting on gamma survey meter, four radio repair trainees in Radiac subcourse check their work on the calibration range. Small cone-shaped rig in "bullseye" contains radio active cobalt which produces certain responses on the sensitive meter. The meter is one of many instruments used to detect various types of radiation common in working with the atom.

Use Up 75 Poles Weekly

Sixty-three climbing hours, or roughly one month, turns a once-smooth pole into a mass of slivers. Roughly 300 poles are discarded monthly, with about 75 of these being planted weekly. As part of their training, students are taught both manual and mechanical sinking, and the replacing of poles is accomplished by them every Saturday.

Though the poles become useless for the climbing course, after their surfaces become shredded, they still find use around the installations. Calls are constantly received for them, and they eventually find a home as parking lot barricades, fences, softball diamond uprights, supports for basketball hoops, tent frames for outdoor messhalls, frameworks for the hand grenade course, and the obstacle course.

In the foregoing there has been noted

the considerable aid to instruction provided by school-designed training devices in telephone and warehouse courses. In the radio operator branch of the Southeastern Signal School there is notable use made of a commercially manufactured device—the tape recorder.

Morse code, recorded on tape, is transmitted to students at the radio operator branch—more than two thousand in number—through their headphones from one room housing twenty-three new tape recorders. Code is sent at speeds suitable to all students, from beginner still learning the Morse alphabet, to the veteran of many weeks, averaging twenty-five groups per minute or more.

All students depend on the messages they hear via tape recording to give them the speed and accuracy of an efficient radio operator.

Transmits to 8 Buildings

A jack-board, more commonly known as a patch-panel, transmits the code to eight buildings. The patch-panel is connected by cables to each of twenty-three tape recorders, with twenty-one of them used in the course of a fifty minute period. Eight machines are used for testing, eight for practice and five for beginning students.

Tapes are classified according to groups per minute (GPM). Practice tapes range from ten to twenty-five GPM, with a special twenty-eight GPM tape held in reserve for advanced students. In the beginners category, tapes are designed to teach students a few letters in Morse code at a time.

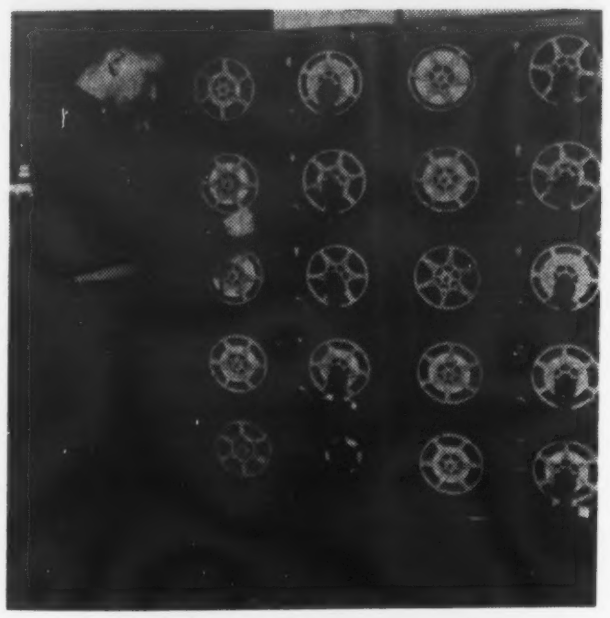
Beginner tapes are arranged with the dot, or "dit," letters first, like the letter "e" which is one dot. After the student passes the test involving letters using only the dot, he is advanced to the all-dash, or "dah" letters, like "t." From there he is taught the combinations.

Students can move ahead in the school as fast as they can master the speed tests. Ordinarily a twenty-five week course, students have been known to finish in as little as sixteen weeks.

The tapes, an hour in length, are all made by instructors in the school. Practice tapes have music interspersed every ten minutes to give students a two-minute rest from the constant "dah-dit" of Morse code. School officials report the better music is on the higher speed tapes.

To give students even greater efficiency and accustom them to actual operating conditions, higher speed tapes include static, interference, and "jamming." These distractions start at twenty GPM and are included in about thirty per cent of the tape.

A backlog of code tapes has been built up. Test tapes are changed every four days with four sets of tapes at each speed available for testing purposes. The student who has trouble getting past a certain speed hears the same tape for more than a week before it is changed.



Above: A battery of tape recorders pipes Morse code into eight buildings, where desired speed is selected, for radio operator student tests.

Below: Practical instruction in pole climbing are two of first steps taken at pole line construction school. An instructor climbs pole to show a class how it is done.

Below: One of many training aids constructed by personnel of telephone installer-repairman course, this nine-foot telephone pole is complete to last detail. It is an exact duplicate of what students will see when they work at the top of a pole.

All code speeds are fed to each building. Patch-panels along each row of desks select the desired speed for that group of students.

An Army version of the tape recorder helps perfect a student's sending and receiving ability in a different way. Technically known as the TG-10, it employs a photoelectric cell and recording needle which pictures the "dahs" and "dits" of the student, showing him if his spacing is correct and each dot or dash the same.

Students are tested on this machine regularly. They are also required to "read" their own messages, played back to them over the headphones. School officials report that this makes the student more conscious of his sending and helps alleviate the radio operator's common complaint: *"That operator should have to receive his own messages!"*

In conjunction with the code transmission a central public address system has also been installed. This is used for announcements on specific school problems and instructions, and for information of a general nature. During ten-minute breaks world series games have been broadcast and important news bulletins announced.

Gripe Session Via P.A.

An interesting, and possibly unique use of the public address system in the radio operator branch is its application in the monthly "Conference Hour," a sort of broadened and refined version of the Army's old gripe session.

Before the program was piped out to students over the public address system talks were on a personal basis with the officers in charge visiting each of the classrooms and answering criticisms and complaints. At that time the school was much smaller and this was a practical, more personal way of handling the sessions. With the rapid growth of the school the personal method became increasingly difficult, and a solution was conceived in piping the conference hour to the students over the P.A. system.

More than five hundred questions are received monthly from the school's nearly two thousand students. Queries are handed in to non-commissioned officers in charge of each phase and passed on to school officials. Questions are screened by the officers and NCO's in charge of the radio operator school, and after questions are processed and duplicates eliminated, they are answered in script form. One recent conference hour used a single-spaced, typewritten script of twenty-two pages, answering specific questions about the school and general questions about the Army.

The program is usually handled by two staff members. Often two enlisted men will answer the questions. Using two voices, the program can be organized in question and answer format. Programs are either live or tape recorded.

The value of the program is pointed

Instructor explains to student highly intricate "coke machine" which is able to send and receive tape relay messages simultaneously.

up by M/Sgt Martin L. Jenkins, course sergeant major, who states the view that, "The conference hour makes the student feel like he's more a part of the school. In all cases, when a student doesn't feel as if his questions have been answered satisfactorily, he's encouraged to visit the officer in charge and clear it up. Questions of a personal nature are eliminated from the script, and the student concerned is asked to talk it over in person."

Radio students at the school take a keen interest in the Camp Gordon Radio Club, as attested to by the number of members, and the club's activity measured in volume of messages handled during last year. By the end of 1951 the club had signed up its 1000th member, and during the year had handled a total of 15,946 messages. Of this total of messages, approximately 10,000 originated from the Camp Gordon outlet.

Other highlights of the past year for the radio club included its affiliation with the American Radio Relay League, from which it received a public service certificate for its handling of 440 messages during the Kansas flood emergency in July; the taking of regional first place honors in the world-wide DX contest, in which it earned more than 36,000 points; membership each month of the year in the Brass Pounders League, for handling more than a minimum number of messages; and the winning of the Panama Canal amateurs' first "sticker" awarded anyone in the world for contacting 50 or more stations in the Canal Zone — the Camp Gordon club had 80 contacts.

The Camp Gordon Radio Club, serving in both MARS (Military Amateur Radio System) and ham circuits, is the network control station for the state of Georgia in the MARS system, and is alternate network control station for the Third Army area. In ham circuits it is a member of the Georgia Cracker network and is one of the main outlets for messages being transmitted outside of the state. Other ham nets include the Atlantic network of the eastern seaboard and the Fourth Regional network of southeastern states.

The Camp Gordon schools, as with all other Signal Corps schools, have as their purpose the producing of trained specialists in technical fields. But these specialists must also be soldiers. They must be prepared to perform their specialities in combat conditions. And their training at Camp Gordon for this eventuality is also thorough. After their class room study they move into the field where they are given first hand, battle-tested experience in inter-echelon communications.

Joint Operations Group, established recently at Camp Gordon, directs all field operations. A simulated army, three corps, and nine divisions, complete with all types of the latest equipment, is now operating.

JOG includes representatives of the Southeastern Signal School, Signal Corps Training Center, Signal Corps Replacement Center, and the Unit Training Group.

UTG Operates "Army"

The Unit Training Group has been operating the "army" and its three corps for the past several months, during which time complete communications facilities between four far-flung headquarters have been operating. The commanding officer of the UTG, Lt. Col. Merrill K. Peters, has assumed the role of "commanding general of the One Hundredth Army" for the exercise. He is directly responsible for the training of the many TO/E units at Camp Gordon.

The job of supervising communications installation, operation and maintenance has been delegated to Lt. Robert A. Frase, plans and training branch of UTG. He has been designated "army signal officer." Lt. Frase emphasizes that, "We are trying to make this operation as close to actual combat as we possibly can."

The operation was begun last October when One Hundredth Army was "activated" and "ordered into action." Shortly afterward the CCXIV and CCXV Corps were given similar orders. In December a third corps—the CCXVI —was ordered "out of reserve" to "defend" Camp Hancock and Daniel Field against possible aggressor attack.

Officers in charge of the project point out that actually this is a continuation of the Southern Pines maneuvers held last summer in the Carolinas. "We are working on the assumption that the Second Aggressor Army has captured all of Florida and may "attack" the Camp Gordon area at any time," a top project officer stated.

Army headquarters has been established in three buildings in a remote area of the post. There a complete "combat" communications center is in operation. Through wire and radio facilities thousands of "drill" or practice messages are being transmitted on an around-the-clock basis. Signalmen manning this and other subordinate headquarters work three eight-hour shifts from Monday morning to Friday at noon.

The comcenter duplicates to the nth degree a similar setup which would route and handle messages during wartime operations. Strict security measures have been invoked throughout the area where the One Hundredth Army and its corps are deployed.

Complete Army Facilities

The army signal officer, Lt. Frase, pointing to a huge circuit diagram above his desk, explained that communications facilities now being utilized include command and administrative radio nets, radio teletypewriter networks, VHF radio telephone hook-ups, a microwave radio relay system for radio telephone, complete wire circuits for telephone and teletypewriter service, and last but not least, messenger service. "We are furnishing everything necessary for actual division to corps to army communications," Lt. Frase states.

Recently wire crews from the 14th Signal Operations Company completed stringing several miles of spiral-four cable to effect wire communication between Bradley—army headquarters—and JOG and Lt. Frase's office.

To give teletypewriter and radio operators diversified training in situations they would likely encounter in overseas areas hundreds of words of "press" copy and communiques are being transmitted regularly. These dispatches are prepared for One Hundredth Army by members of the Signal Corps Training Cente public information office.

A daily communique summing up action and important events during a 24-hour period is prepared and transmitted over the full command teletypewriter net at 11 a.m. each day.

Every few hours messages originating in the office of the signal officer instruct army or one of the corps to make changes in a certain circuit by changing terminals and other wiring by a deadline prescribed by that office. This aims at giving the men the know-how of working against time and changing facilities to meet existing situations.

In order to carry out the student participation phase of the exercise, Camp Gordon officials have established a special company staffed with technicians from every signal military occupational specialty (MOS). These men will lead teams of students assigned to the various corps and division headquarters.

With the end of the Korean conflict not yet in sight, it is certain that many Camp Gordon graduates will be going to the Far East to replace signalmen now in the field. Officials of the Signal Corps Training Center are making sure that the men they train will know their job and how to do it under combat conditions.

MULTIPLE ADDRESS EQUIPME

By Capt. Robert W. Danford

In radio-teletype tape relay operations that involve handling more than half a million groups of traffic daily, wasted steps and minutes lost are clearly reflected in increased handling time per message.

Constant awareness of this yardstick by which efficiency is measured imposes on tape relay personnel a responsibility to investigate every avenue that promises to lead to greater efficiency through reduced handling time.

In this respect there is nothing more time-consuming in the operation of a relay station than the procedure for handling multiple address traffic—traffic received as a single tape that must be relayed onward to several points. The necessity for manufacturing multiple reproductions of message tapes becomes obvious from the very beginning.

This need and the problems it may encompass is perhaps the most distinguishing characteristic of military tape relay as compared to its commercial prototype.

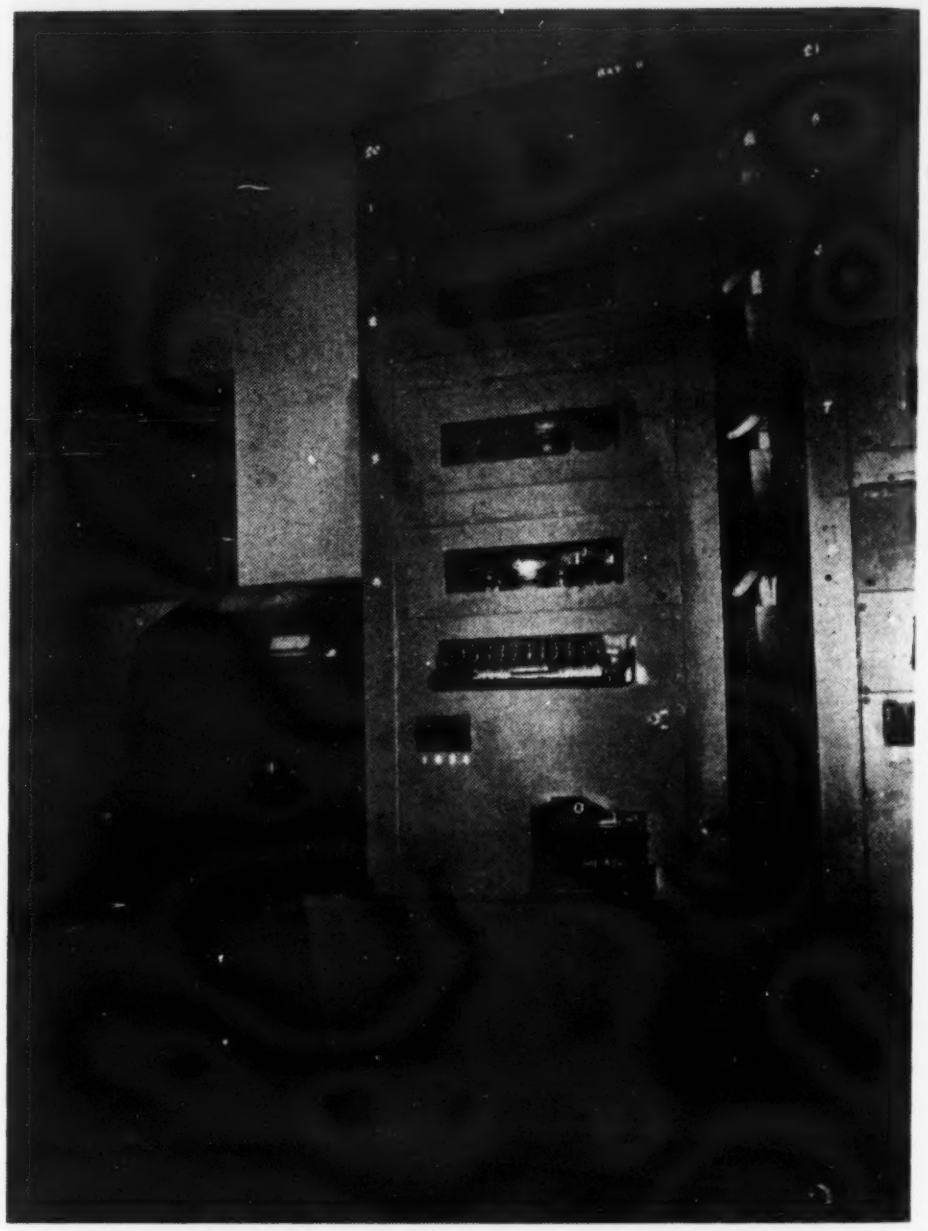
Since, in military practice, a single message is likely to be transmitted to several addressees served by a single relay point, the alternatives for serving these addressees with the single received tape are two: a) the tape may be re-transmitted several times, viz. to each addressee, one at a time, repeating the process until it has been transmitted to each or, b) several reproductions of the received tape may be manufactured simultaneously enabling each transmitting operator charged with relaying it onward to do so at once, cutting delay to a minimum and relieving the need for carrying a single tape around to several pieces of equipment which complicates logging it out.

To accomplish the latter method, which is vastly more expedient and efficient, tape manufacturing equipment must be assembled that includes a master transmitter-distributor and a sufficient number of typing reperforators connected to it by "in-out" switches to manufacture the required number of tapes—usually from five to seven. It is desirable to also include at least one page printer for monitoring purposes and to employ a manual keyboard for typing separate address headings on each tape.

In meeting the requirements set down above, the construction of multiple address equipment is likely to involve serious problems centering around restricted space for installing it, limitations of materials and equipment components for actually constructing it and, if space limitations are too carefully observed as they are apt to be in the average relay station, inadequate accessibility to it from the standpoint of both operator and maintenance man.

It is the purpose of this article to describe in more-or-less detail *one* solution to these problems that, at this writing, has proven to be very practicable and one which definitely meets the space-materials-accessibility considerations.

The problem, in this particular case, was to re-design a rather sprawling, ungainly assemblage of equipment already in existence rather than start from the beginning. The outmoded equipment, while it functioned satisfactorily enough insofar as it fulfilled its stated purpose, was impractical due to the proportionate amount of floor space it occupied in an installation of strictly limited size, and was poorly organized from a maintenance standpoint since all integral components were exposed to the open and collected large



Completed assembly consists of two bays placed side by side, each flanked by its associated page printer equipment.

amounts of dust, etc, in addition to presenting an archaic maze of wiring not generally understood by school-trained teletypewriter maintenance personnel.

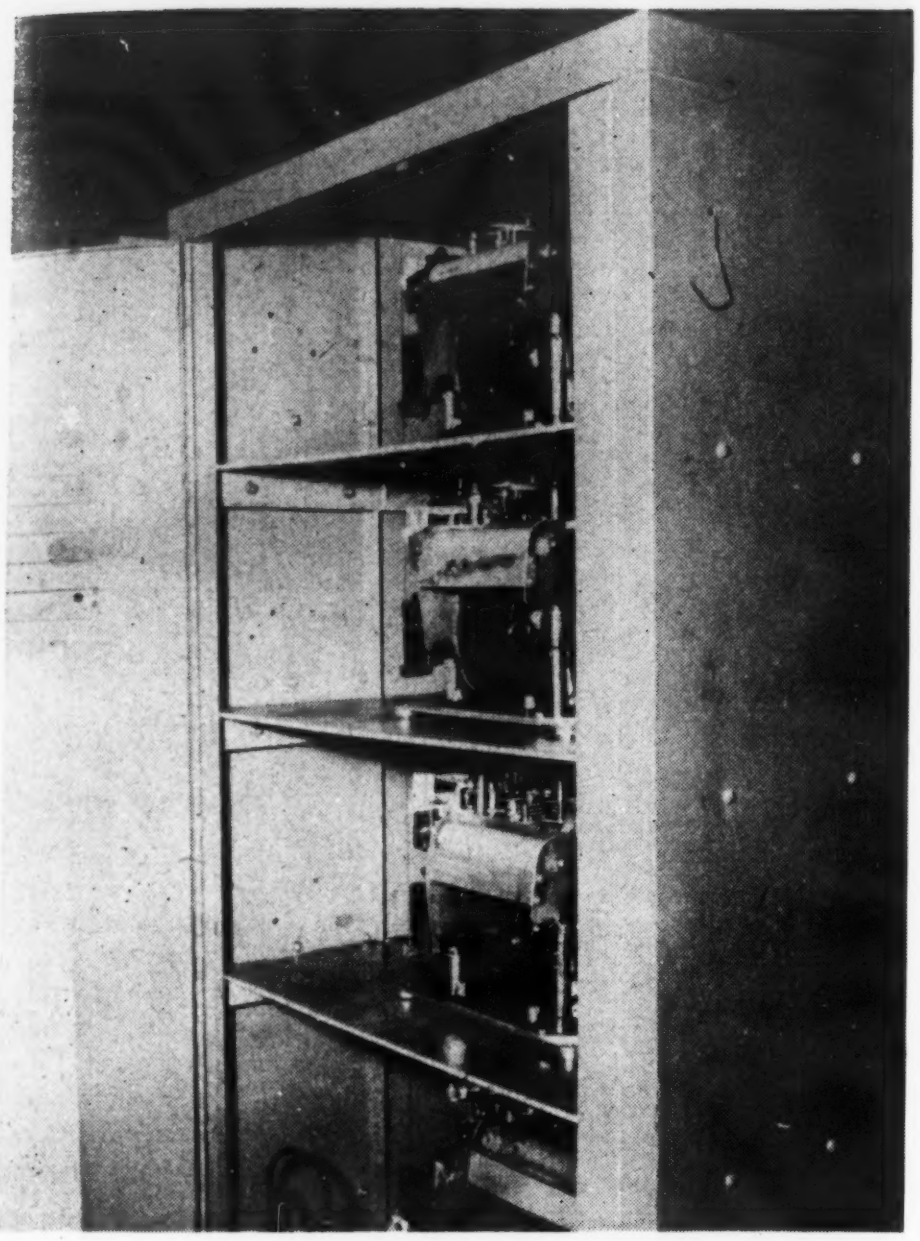
It was readily apparent that the exorbitant floor-space occupied by the former equipment was due to low, horizontal construction, easily remediable by stacking the major units atop each other wherever possible, while the simple expedient of enclosing everything but the master transmitter-distributor head and keyboard with slot openings provided for issuing tape would correct the other major fault.

This seemed to suggest a bay arrangement rather than a shelf arrangement as was the plan used before, so the engineering proceeded on that basis.

Now the problem of enclosing from five to eight typing reperforators (the old equipment had eight) in a simple bay could not, of course, be met for obvious reasons so a series of bays was called for.

Materials—principally two standard-sized 19" panel mounting, equipment bays, plus a miscellaneous collection of aluminum sheets for use as front panels, etc, were obtained from local salvage sources. These bays, long consigned to the junkpile and in poor condition were sand-

FOR TAPE RELAY OPERATIONS



Maintenance is made easier by access through a full length door in the rear of each bay.

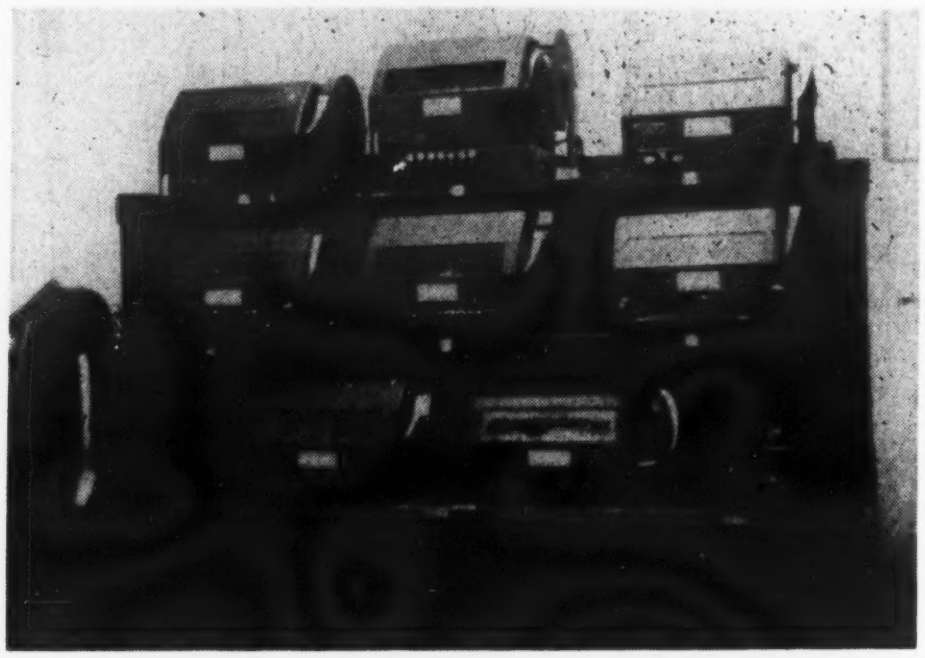
blasted to remove old paint and corrosion, then repainted a neat gray preparatory to actual installation of the equipment.

It was decided to adhere to the old plan of eight typing reperforators, in this case the model M-14, as issued, in order that a maximum number of tapes could be processed. However, since two bays were to be used, it was further decided to design the equipment as two major components containing four typing reperforators each and to provide a master transmitter-distributor with each component plus a page printer teletype monitor with each.

Thus the equipment would be doubly versatile to the extent of being one multiple address unit capable of reproducing eight tapes simultaneously or as two individualized units with separate operators, capable of producing four tapes, each working separately from the other.

The following list indicates the principal components of equipment required for the project and the more important accessories:

6 each Typing Reperforators, Type PR 21GB
2 each Typing Reperforators, Type 17N with bases and keyboards
2 each Transmitter-distributors, Type TXD86-FR



Operation is simple—demands nothing more complex than ability to associate numbered lever key switches with correspondingly numbered typing reperforators desired.

2 each standard 19" panel mountings, equipment cabinet racks
2 each Teletype page printers, Type M-15 with tables
2 each Rectifiers RA-23
9 each Lever key switches
8 each 2000 ohm 10W resistors
2 each 3000 ohm 50W variable resistors
2 each 100 ohm 50W slip trapped resistors

Other equipment of the miscellaneous nature included 1/8" prexi-glass for panel windows and tape chutes, standard 5/8" tape reels and various types of terminal plugs and jacks.

Cutting-out of front panels and interior equipment chassis trays was done by the local sheet metal shop following working sketches prepared by the engineering draftsman employed by the installation. All other labor was performed by enlisted personnel of the station working under guidance of a Department of the Army civilian radio engineer who was a member of the station staff.

Since the primary objective of the design was to enclose as much of the integral equipment as possible, most of the drilling and fitting took place inside the bay with the final result presenting clean exterior lines, simplified wiring and a very simple system of switches for inter-connecting the various major components, depending on the particular function of the operator.

Installation of the equipment inside the bays was accomplished in such a manner that only the slightest interruption in multiple address processing within the station occurred during the final wiring of the assembly. This was made possible by completing circuits as soon as each typing reperforator was removed from the old equipment to be transferred to the new. In this manner a certain amount of equipment was left available for the multiple address operator at all times in either the old or the new.

The completed assembly occupies approximately 24½ square feet of floor space in contrast to the 84 square feet occupied by the former, outmoded assembly.

The equipment shown in the accompanying illustrations

(*Continued on page 70, col. 1*)

Motorola

By Ned Chase

Although many people know that Motorola Inc. is the world's largest independent auto radio manufacturer, and quite a few know it is one of the four world's largest manufacturers of television, only very few know that it is the world's largest manufacturer of mobile 2-way radio communications equipment, indeed does more business than all its competitors combined. This is understandable; the average consumer has no daily need for 2-way radio, although Motorola's enterprising sales force may convince him otherwise before very long.

Most startling fact of all is that while Motorola is today one of the two world's largest manufacturers of all types of radio and television, the company began with $565 and five employees only twenty-three years ago, on September 25, 1928, in an old building at 847 Harrison Street, Chicago. Last year's sales amounted to $177,104,669, the fruit of the labor of about 9,000 employees in a dozen modern plants.

The story of this extraordinary growth is in good part the story of Paul V. Galvin, the company's founder and current president. Appropriately enough, Galvin started working as a boy, recalls stripping tobacco leaves for a Harvard, Illinois, factory as his first job, (he was born in Harvard) but rates a popcorn concession he had in a nickolodeon when he was twelve as his first real entrepreneur-ship. He worked his way through the University of Illinois and then held a first lieutenant's commission in World War I.

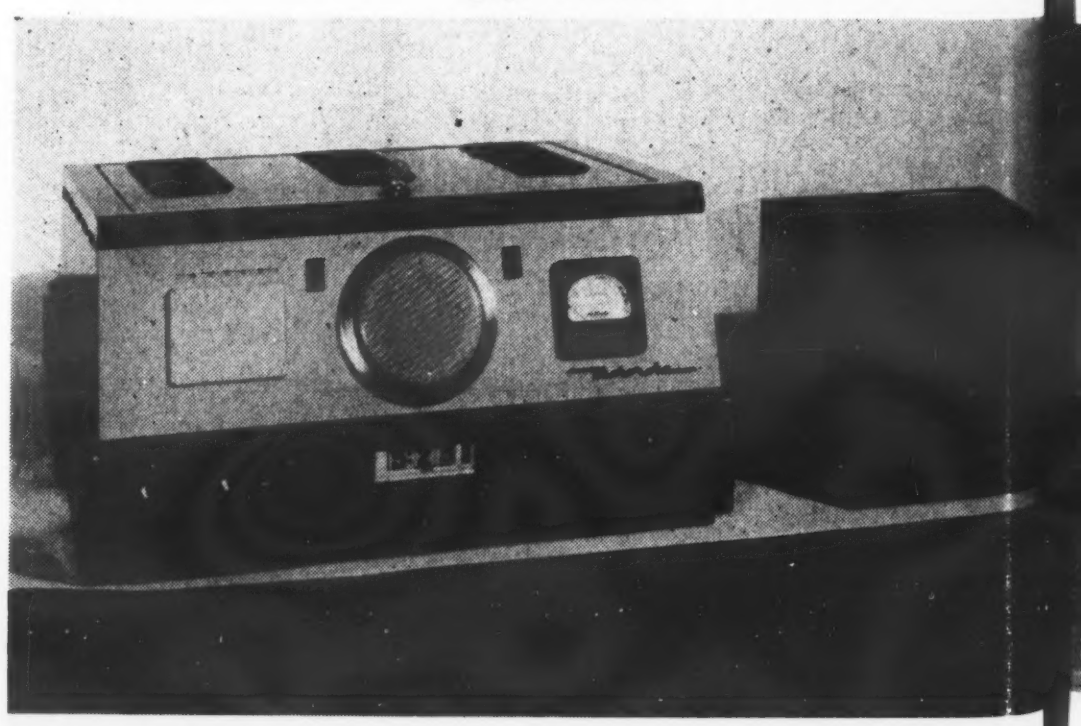
But his story and Motorola's become one a decade later when the Galvin Manufacturing Company, as it was then called, became incorporated and shortly after began making "A" eliminators, which eliminated the need for the batteries used by early radios. The introduction of the AC set late in 1929 killed the market and Galvin and his brother, the late Joseph E. Galvin, faced a bleak 1929-crash-year-Christmas. The company made $6,014.75 that year but prospects were nil. Indeed the radio business in general was inert, with inventories at peak. There was just one region in which to expand, the new universe of the automobile, but as yet the necessary radio-device had not been invented.

Displaying an intuition which has served Motorola handsomely on this and several notable occasions later on, Galvin decided to make car radios. His recollection now is that his mind drifted there after hearing from a New York radio parts salesman that a couple of young engineers had concocted such a gadget on Long Island and were making bread-board radio installations in cars for something like $300.

It occurred to Galvin that the way to make money on this was to put the set in a can, with a control on the steering column, and design it for mass production. There being no "know how" about car radios at that time, Galvin and his engineers assumed vibration would be the chief problem. He tried putting tube sockets on springs, shock mounting the chassis on rubber, and using various cradle suspensions. The springs managed to bounce the tubes around the motor (the set was mounted on the fire panel between engine and the driver's compartment) until the fan busted them. Rejecting the scientific approach, Galvin then decided to put

Paul V. Galvin, company founder and president, shown with early model automobile radio which made famous the name Motorola.

Complete recording station. Motorola receiving equipment and scaler-divider unit indicates count from remote radio-active snow gage stations.



the tubes in the sockets tight, in the ordinary way. This worked.

By the summer of 1930, after three successful test sets were made by hand, Galvin and his men had a car radio good enough for the market. The first set was a five-tube superheterodyne. Galvin thoughtfully provided the tuning knob with a lock, because he reasoned that a car radio would be such a novelty that parking station attendants would play it continuously and run down the owner's battery. This first set got its six volt power from the car battery and carried auxilliary "B" batteries for 45 and 90 volt supply. (By the fall of 1931, the set got all its power from the car battery through a vibration and set-up transformer.)

Galvin credits fate with an important role in the success of Motorola as others credit Galvin's own perseverance. foresight and judgment and his profound belief in quality engineering, and he cites his experience in overcoming the problem of tuning this first car radio as evidence. The chassis was located inside the hood, the tuning knob several feet away on the steering column. First he built a linkage which had several universal joints and rods. This gave positive control of a sort, but vibration rattled the rods, rattling the variable condensers in turn and making the broadcast sound at times like an animal in pain.

Now in those days, Galvin took his money daily to the late Union Bank of Chicago. A bank officer named Leo Cummings took a fond interest in the struggling new company. Asking Galvin how things were going, Cummings learned that the flexible shaft problem had yet to be licked. Without any comment, Cummings made a quick phone call and asked someone on the other end to tell him the length of some flexible shafts just arrived from Germany. These shafts happened to be thirty-two inches long, exactly the length Galvin needed. He promptly bought the whole shipment, 1700 of them. It seemed Cummings had been tinkering with a washing machine and had ordered thirty-six inch shafts but got the thirty-two inch shafts by mistake.

Galvin bought such shafts from Germany until the S. S. White Dental Company here began bringing out a suitable version of their own. He is sure destiny took him to the only man in the world who not only knew the sole manufacturer of flexible shafts but who also had 1,700 of them in a shop six blocks away.

Motorola's first car radio commercially marketed sold for $109.50, a third of the custom-installation price. The first sets were made under several private names, like Paramount, used by his south Chicago distributor. Then one April morning in 1930, the name Motorola came to Galvin as an inspiration. It was destined to cover the whole organization and its products.

Original Car Radio Set

Galvin now has the historic number one model car radio made in a glass case. (See illustration page 18.) Chicagoan Harry Kline, owner of the Triangle Electric Company, sought out Galvin in June, 1930, with the desire to be the first car radio dealer. Kline got the first set, had it installed in the car of a policeman friend of his scheduled to make a trip to Denver. He wanted the set to undergo a really good shake-down test on the road. It survived the trip splendidly.

Galvin forgot about the set until six years later. In 1936 his late brother Joe told Galvin he had learned of the location of the first set. It now belonged to a police sergeant Walsh, of Oak Park, son of the first customer. The sergeant liked the set and planned to take it from his father's car and put it in his new car, but he'd never gotten around to it. Galvin went to the Walsh's Oak Park garage, rescued it from a pile of oddments on a shelf and bought it.

Galvin's sound notion to put a car radio in a can, make it work well, and keep the price low made Motorola the first successful manufacturer of car radios; but the hurdles were many, mostly technical but also political. Righteous public officials frequently came out in print condemning car radios as public safety menaces. Galvin then personally showed and convinced aldermen and commissioners that a driver could operate and listen to a radio without running berserk. Thanks to his efforts and the help he got from the Radio Manufacturers Association, no anti-car-radio legislation got on the statute books. But the papers gave Galvin many uneasy moments.

By 1937, Motorola, having established a national name for its product and having boomed right on through the depression, decided to crack the home radio market. The years 1937 and 1938 were difficult ones but the set-backs were weathered and it was at this juncture that the communications division emerged as war approached.

As a matter of fact, though it is not generally known, Motorola had become involved in the communications field (as opposed to receivers for standard broadcasts) practically from its start. In the early days it was natural to take Motorola's auto radio and modify the coils so police broadcasts on special frequencies could be received. Motorola actually supplied police radio receiving sets in 1930.

On the strength of its excellent quality receivers, Motorola was asked to produce a mobile radio transmitter whereby a police car could reply to headquarters. Tested under fire by their radio experience, Galvin's engineers addressed themselves to the task with an unheard of directness, tackling what had been an esoteric problem with the mass production "product" approach and infinite faith in the efficacy

Typical repeater station on mountain receives signals from several radio-active snow gage stations and sends them on to recording station.

Outdoor sensing unit disassembled. Top to bottom, housing and mounting clamps; chassis with Geiger Muller tube, impedance transformer tube circuit and magnetically operated beta standardizing source, all mounted.

Tests have indicated that $30,000 a year can be saved through increased efficiency on radio equipped vehicles. Above, Timken Roller Bearing Co. dispatcher directs straddle truck seen through window. Below: Consolidated Vultee Aircraft Corp. driver asks for work assignment.

of really sound engineering. They developed a revolutionary mobile radio transmitter. For the first time in history, a complete 2-way AM radio communication unit for an automobile could be had for $265.00, just a quarter of the price of other mobile units on the market. This was the Motorola T-69-20 AM transmitter, used with the P-69-12 receiver. It took the police world by storm.

At that time, however, the best 2-way AM equipment was not satisfactory for all police organization requirements. Two occurrences of decisive importance for Motorola occurred at this time in this connection. In 1939, the State of Connecticut decided to develop a means of securing satisfactory communication with its state police patrol cars on a state-wide basis. Colonel Hickey, Commissioner of State Police, retained a professor of electronics at the University of Connecticut named Daniel E. Noble to design a state-wide police radio communication network. Noble, a teacher at the University for seventeen years, was an authority on Frequency Modulation. He decided that FM, with its unique property of eliminating noise, was the thing to use. Because of its proximity, the F. M. Link Company was approached. Mr. Fred Link was not then convinced that such equipment would out-perform AM apparatus, but willingly agreed to make the equipment in accordance with Noble's plan. The work proceeded, the installation was made and the system proved its worth.

Somewhat prior to this, Galvin, after a European holiday trip with his family to Germany, became increasingly convinced of the imminence of war. One morning in 1938, he had a hunch and on the way to his office dropped in on his chief engineer, Don Mitchell. He told Mitchell that he figured Motorola had better have something on hand for the storm, something like a 2-way telephone radio, namely a transceiver. On this suggestion, Mitchell and his fellow engineers set to work and soon came up with a passable one.

In 1939, Royal Munger, then financial editor of the *Chicago Daily News*, who was a reserve Army officer, called Galvin and told him that the National Guard then maneuvering at Camp McCoy, Wisconsin, were hamstrung for lack of radio communication equipment and asked if Galvin might help out.

Galvin dispatched Don Mitchell with 21 units, relatively crude instruments compared with today's Motorola "Handie-Talkie" and "Walkie-Talkie" units, and these were installed in the decks of the Army umpires' vehicles during the practice war games. Since the National Guard boys were provided with practically nothing but pigeons, the equipment was something of a revelation to them. Even die-hard Army devotees of the principle that any equipment that takes away riflemen is a liability had to concede that this first real test of such units was a success.

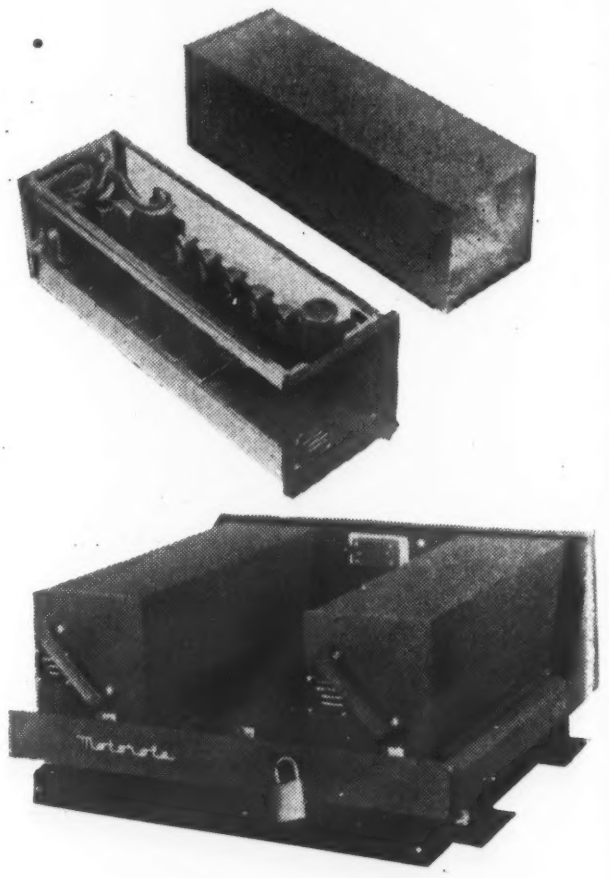
Things began to snowball. A prominent Signal Corps colonel from one of our Army headquarters became intrigued, conferences with Mitchell resulted and Mitchell created the idea of an exceptionally light and handy transceiver, a unit in the form of a "French" telephone. A widening circle of important officers became increasingly pleased.

Galvin was pleased, too. He authorized $10,000 for Mitchell to devote to ironing out his "Handie-Talkie" unit idea. But he made this provision: they must make three fully effective working units, no less, before they could show a thing to the Army.

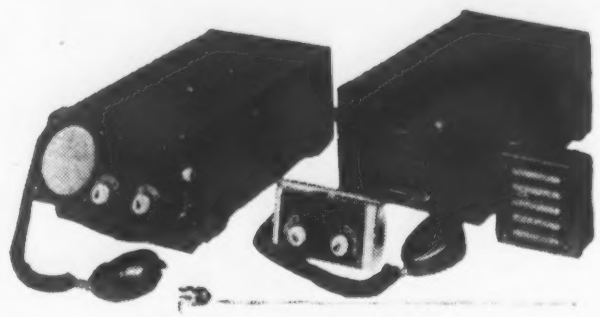
It was about this time that Galvin, now fully dedicated to the proposition that Motorola could look to a splendid future in the communications business, with his obsession for quality engineering and his ideal of having only top engineers on his team, set out to find the best man in the frontier field of mobile communications. His investigation led him to the Connecticut State Police radio network and thus to Daniel Noble, its creator. Galvin went to New York and arranged a meeting with Noble in 1940, persuaded him to take a year's leave of absence from teaching to devote himself to research at Motorola and then decide what he wished to do with his future. Six months trial convinced Noble that, happy as he was as a professor, his real future lay with Motorola. He shortly became its director of research.

Meanwhile the "Handi-Talkie" unit had come into being and Mitchell,

Below top to bottom: Selector unit provides for five on-off control functions. Selector unit and the compression amplifier mounted on new Motorola horizontal rack.



Dr. C. W. Cromley of Ashville, Ohio, is checking with his home over his Motorola two way radio. He has finished a visit at one farm and will proceed directly to the farm where he is needed next.



Motorola Uni-Channel Sensicon Dispatcher. Left, single package unit; right, with individual speaker and control head for truck mounting.

joined by Noble, personally demonstarted the three units at the Signal Corps laboratories at Fort Monmouth, New Jersey. This was in February of 1941. The response was enthusiastic, the Signal Corps asked that the units be at once demonstrated to the appropriate infantry board for the final OK, and there, after passing with flying colors, the initial contracts were written. By June of 1941, six months before we were at war Motorola had a regular production contract with the government.

This was for the SCR536 "Handie-Talkie" unit. Nearly 40,000 of this model unit was made for the services during World War II. To accomplish this at that time—the production on a mass basis of a complete transmitting station and receiving station in one tiny unit with its own power supply—was a miracle of modern electronic engineering and played a chief role in the fact that Motorola earned five Army-Navy "E" awards. They went into quick use with Air Force gliders. It was in the North African invasion, where communication inadequacies were serious, that they proved their essentialness and after that their acceptance was universal.

Motorola now was devoting nearly all its facilities to making military equipment. Early in the war, Noble was approached by the Signal Corps and asked if Motorola couldn't solve the longer-range portable set problem as it had the "Handie-Talkie" unit problem. He explained that the Army had released several contracts for the equipment in hope that someone might produce a unit of acceptable range and performance characteristics. All of these contracts called for AM equipment. From his experience in the 40 MC police field, Noble advised that the best solution would be found in the design of FM equipment. That, said the Signal Corps, is what we'd like you to do. Noble then explained at some length what he believed should be done.

After a further discussion of the problem with Signal Corps engineers at Fort Monmouth, Noble returned to Motorola. He called in one of his top men, engineer and scientist Henry Magnuski, and they outlined their plan of attack. Without waiting for the release of the specifications or the Signal Corps contract proposal or for the signing of the contract, they developed a design which included a single tuning control to tune both the transmittter and the receiver simultaneously and the use of automatic control in the receiver to insure maximum sensitivity at all times, even though the operator failed to adjust his transmitter and receiver and tuning knob to exactly the correct position. Within a matter of weeks, they were testing the first model. They first got only a half-mile range, then a mile, and within three weeks more were communicating reliably over ranges of five or six miles. The result was the famed SCR300 FM "Walkie-Talkie" unit. Motorola was to produce nearly 50,000 during the course of the war, for use by all the services. The first production units were transported by air for use in the Italian invasion. Then they went to the Pacific and eventually for use in every theatre of war in the world. Their great contribution was the European invasion and preeminently their role in re-establishing order at the conclusion of the Battle of the Bulge, for which Motorola is the proud recipient of a message from a general involved to the effect that the SCR300 was the most useful single piece of communication equipment employed in the invasion.

The war almost completely dominated Motorola's production. Besides the SCR536 and the SCR300, the company produced the TS-126A/AP synchroscope; the SYN-15 synchroscope; the AN/PNN-2 marker beacon for paratroop use; the SCR-511 portable transmitter-receiver 2-6mc (vehicular); the SCR593 four channel unit (vehicular); the SCR609, 610, 509 and 510 for field artillery and armoured car use; the AN/APA-6 and -1 pulse analyzer; AN/APR-1, AN/SPR-1, AN/APR-5, AN/APR-6 AN/APR-2, and AN/SPR-2 radar search equipment 40 mc to 6,000 mc; the AN/APG-8, -5, -13, -15 airborne range equipment (automatic tracking); the AN/CPN-6 X Brand, the AN/CPN-8 S Band and AN/CPN-17 radar beacons.

What is more, Motorola delivered 35 million quartz crystals during the war—more than half of all the quartz crystals used in the entire war effort. This program was credited and supervised by vice president Elmer Wavering in the Chicago main plant and it made a vital contribution to the Signal Corps at the critical time when the supply was dangerously low.

Fortunately, over the years, Motorola had acquired numerous new plants to house all this wartime activity, notably the ultra modern new plant at 4545 Augusta Boulevard, Chicago, built in 1937 and its additions in 1942 and 1944. About the time the main plant was completed before the war, Galvin, who had a keen interest in television from its start, saw to it that some of his top men did research in the field. Indeed he hoped to have Motorola television receivers on the market by 1941, but the war intervened. However, after the conflict ended, Galvin had his television engineers spend over a million dollars during 1945, 1946 and 1947 on

research and developmental work for his first TV line. Galvin rightly predicted that the mass production of TV sets would be infinitely more complicated than radio and that unforeseen problems would cripple the unprepared outfits from the start. Consequently, Motorola's prewar and immediate postwar spade work gave the company a cumulative background know-how that was later to give them a commanding advantage over most of its competitors.

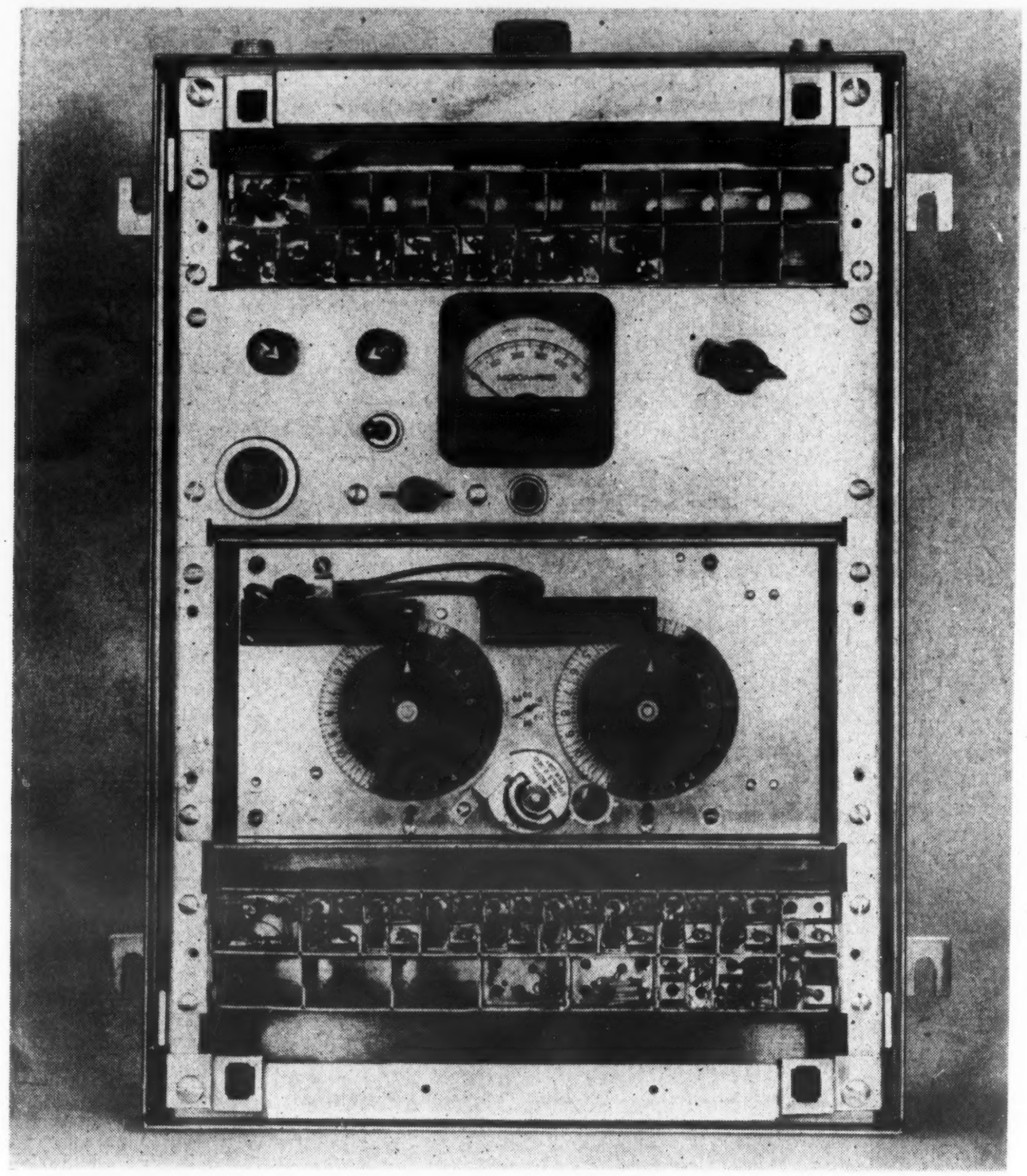
Other non-military activity occurred at Motorola during the war. A prime example of the kind of crisis that Motorola has had to face from time to time and has always licked is offered in their crisis of 1942. That year, when Motorola had 125.000 brand new car radios on hand, the government suddenly ordered a complete ban on new car construction and new radios. This was the situation when Galvin had to confront the national convention of his distributors that year. The problem was, bluntly, how to keep his whole distributor organization from bankruptcy; how to ever unload these sets.

Characteristic preseverance and ingenuity saved the day. Led by Elmer Wavering, pioneer Motorola engineer, the company's engineers went doggedly to work, with practically no materials and faint chance of success, and managed to convert these 125,000 six volt battery units into home radios capable of working on 110 volt house current. Here and there they managed to get cabinets built. When the sets were finally converted, they were the only new home radios available in the United States.

They were thus the saving grace for many Motorola distributors. By releasing them slowly, throughout the war period, the distributors were able to ride out the era of controls successfully. In addition, Galvin arranged important subcontracts for many of his distributors. For many of them it was a near thing. Experience like this has made the Motorola organization the intensely loyal group it is.

Although the company was almost completely mobilized for military work during the war, on its own initiative and at the sacrifice of the larger profits that could be made from war contracts, Motorola continued to allocate a small portion of its facilities to the production of 2-way communication equipment for the various police systems in the United States. Motorola had entered this vital field in 1936 and Galvin believed that his company had an obligation to continue to supply these instruments of internal security. The War Production Board agreed. During most of the war, two other companies also manufactured small quantities of such communication equipment, and during the latter part of the war, the opportunity was made available to several companies by the WPB. But only Motorola accepted this obligation. During the period of the WPB, Motorola supplied 85% of all such 2-way communications.

Complete Motorola repeater stations. Units from top to bottom. 1/2 watt F.M. transmitter, control and meter panel, jewelled-escapement, spring-driven time switch wound periodically by small electric motor, and F.M. receiver.



When Dan Noble joined Motorola in 1940 as its communications director of research, he at once devoted himself to profiting from his FM experience in setting up the pioneer Connecticut State police system. In his first year at Motorola, Noble succeeded in developing an excellent squelch circuit which activated the speaker whenever a received signal reduced the noise at the receiver output. It proved to be so sensitive that the effective range of squelched receivers was substantially increased.

Most important of all, Noble also set himself the task of surrounding himself with the finest engineers he could find. He wanted, and he got, specialists utterly dedicated to the new art of mobile communications. They were never complacent. Galvin says that Motorola FM 2-way radio in 1941 provided just fair communication, but when compared with Motorola AM and the 2-way communication equipment of other manufacturers, it was very good indeed. The conclusive evidence was that Motorola provided successful FM mobile radio suitable, for the first time, for state police operation.

The Michigan State Police were quick to see the possibilities of FM 2-way radio and made test installations at East Lansing, the State Police Headquarters at Detroit, at Jackson and at Flat Rock. The results were so impressive that the State of Michigan Board of Purchase authorized a special appropriation during the war emergency in order to equip all Michigan State Police posts and all State Police cars with Motorola FM 2-way radio. The system was completed in 1942.

Because Noble and his engineers had incorporated such far-sighted design in Motorola's FM mobile equipment, there was no need for basic changes and consequently no new line from 1943 to 1947.

But with the war over, the improvements were bound to come and with them a revolutionary expansion in the whole field of communications, a revolution in which Motorola was to play a leading role. Motorola turned to a whole new business of providing equip-

(*Continued on page 72, col. 1*)

THE BATTLEFRONT

has no DIAL TONE

unknown, half-dozen Infantryman ...ched a lineman of the 4th Signal ...ttalion of X Corps sway in the icy ...nd atop a telephone pole and gave ... battalion a laurel which has gone ...own in unit history:

"You gotta hand it to those guys, They've got one of the toughest assignments in Korea."

To date nobody has ventured to dispute the remark; and the same admirable description of the 4th Signal Battalion's work has been repeated time and again.

The plaudit hasn't been easily won. Back at Fort Bragg, N. C., the motto, "We Get the Message Through," was just another pat-on-the-back slogan on a battalion's coat of arms. But since landing with General Almond's X-Corps forces in the liberation of Inchon-Seoul September 1950, the battalion has lived up to the boast—carrying the message in one hand and firing a carbine with the other.

The road of conquest on both sides of the Korean peninsula has been an uphill climb all the way. But beside that road the Signalmen have marked a trail with more than 14,000 miles of telephone wire, the nerve fibre of the X Corps' fighting forces.

Glories of the 4th

Through a vast network of communications, the 4th Signal Battalion has kept Tokyo and Washington at the fingertips of the Corps general staff. Telephone lines, teletypewriter and radio-telephone systems have been operated by Corps troops, with the coordinated aid of the battalion, as far north as the banks of the Yalu River.

Individual glory for an outfit as small as a battalion is usually lost in the vast shuffle of battle, but not so for the 4th Signal. They have earned the praise of the Army's hard-hitting 7th Infantry Division, the X Corps spearhead to the Manchurian border. They fought beside the men of the Marine Corps and the Marines came away marveling: "You guys are terrific." MPs, standing at freezing, dusty crossroads in the middle of a winter's night, have forgotten self-pity in watching the Signalmen walk down a cold road laying wire from a hand reel.

There are few soldiers in the entire X Corps who have not heard the glory of the 4th Signal sung by their own buddies.

At Hagaru-ri, where Army and Marine forces were isolated by a sea of Red China's best soldiers, the 4th Signalmen fought off the enemy and maintained the vital communications which facilitated movement of relief forces pushing up from the south.

And it was at Hagaru-ri that Los Angeles took a shattered village in North Korea into its city limits when 1st Lt. Jack Calborn of Riverside, Calif., draped the California flag from the mast of a truck radio antenna. Earlier the flag had been presented the battalion, first activated in 1942 in Indio, Calif., by the California governor, Earl Warren.

Two light planes, an L-5 and an L-16, used for battalion courier service, landed repeatedly under a hail of mortar and small arms fire in the Chosin Reservoir sector to fly out 50 wounded GIs.

The men of the battalion have been ambushed and slain, surrounded and battered, but they have never fallen short in their mission. General Almond, describing their activities, hailed the 4th Signal Battalion "as a splendid credit to a long history of Signal Corps Service. Seldom, if ever, has a Signal unit faced the hardships of the 4th Battalion, but in every instance they have 'got a message through.' They have played a key role in the X Corps operations of the Korean War."

The conflict in the Far East is the second for the 4th Signal. They fought well in the campaigns of the Rhineland and Central Europe in World War II as the communications network of V Corps.

The battalion, reactivated in 1946, shortly after it had been put temporarily into mothballs, left Fort Bragg Aug. 13, 1950, on orders to the Orient. In Japan they were hurriedly assigned to the X Corps, the striking force which was to brave the 30-foot tides off Inchon to invade the Korean waistline and cut off the enemy fighting in the south.

The first elements of the 4th Signal pushed ashore on Sept. 18, three days after the invasion thrust, and off-loading was completed two days later.

Although short at least 40 per cent of its construction equipment and hampered by a shortage of tactical wire of all types, the battalion installed and maintained approximately 3,000 miles of wire circuits during the Inchon-Seoul operation.

It was the battalion's responsibility to install, operate, and maintain all long-haul telephone trunk circuits within the X Corps area. In addition, there was a multitude of short and long

"locals" to be installed by the Signalmen.

The two battalion construction units, Able and Charlie, were assigned the mission of carrying out communications with two Corps forces. Able company with the 1st Marine Division and Charlie with the 7th (Hourglass) Division.

They were the only Signal troops, other than divisional units, participating in the gigantic invasion. And despite the lack of equipment, caused when the invasion fleet found its landing operations continually hampered by the rise and fall of towering tides, there was no major flaw in the communication set-up.

But the Inchon-Seoul invasion, rugged operation that it may have been, was to prove nothing by comparison with subsequent Corps campaigns on both sides of the 38th parallel.

Unlike Europe, the 4th Signal Battalion found few communications lines, worthy of the name, left intact during the pounding drive of UN forces up the peninsula. The Signalmen had to spin their lines across bridgeless rivers and across snow-crowned mountains thousands of feet high.

Rough Going

They laid their wire in ravines and along the roadside. They strung it through the tops of trees along the unpaved highways.

And they built radio-telephone relay stations on mountain peaks, to shoot the "voice beams" from one switchboard to another in much the same manner in which television is circulated in the United States.

One of these relay stations was built atop a 3,200-foot mountain accessible in spots only on hands and knees, where

Signalman carries transmitter-distributor unit while wire team works on cable in background. Hungnam, Korea.

it rose on a 70-degree angle into the air. To make the relay station possible, a crew of a dozen Signalmen, with the aid of 50 GIs from the 2d (Indianhead) Division, carted 8,000 pounds of equipment up the face of the mountain.

Despite the six to 24-hour climb with the equipment, which included eight 40-foot antennas and all food and water, the relay station was in operation within a day and a half.

One GI, witnessing the operation, observed: "The guys who built that station make me feel proud to be in the same Army."

Actual clashes with the enemy have been frequent. In many instances the Signalmen in their daily rounds have come under as much fire as soldiers in frontline Infantry units.

Three of the Signalmen have been killed and 25 have suffered combat wounds. They have fought in full-scale battles and against surprise ambushes in the dark of night.

Telephone wire parties have carried their lines through the heart of heavily infested guerrilla "territory" in South Korea, and have time and again been forced to lay down their reels to take up their weapons.

The men who climb the telephone poles have perhaps the most dangerous job in the battalion. "Sitting up there in the air, without moving very much, makes us an ichiban target for any Red sniper," one of the high-wire men reported.

Following the Inchon campaign, X Corps divided the battalion's strength into two groups again, sending one party with the 7th Infantry at the invasion of Iwon in late October high up on the Korean coast, and landing the second on Oct 27 with the Marines at Wonsan. "Wonsan was a little embarrassing for us," battalion commander Lt. Col. Chester L. Martin reflects. "The ROK Capital Division had already liberated Wonsan. By the time we got ashore with the Marines, Marilyn Maxwell and Bob Hope had already presented an in-person performance in the town."

The battle against the enemy and Mother Nature at her brutal best reached its peak in the North Korean campaign. Capt. Roy L. Wilson of the battalion's operations section described the upper extremities of the peninsula as making "the war in Europe and the battles in the Pacific seem like child's play by comparison."

Throughout the northern drive, the battalion lived with a gun in one hand. But the motto was not to be denied. When Corps forces withdrew from Hungnam, the battalion left behind it a record of installing and rehabilitating more than 7,000 miles of wire from Wonsan to the shadow of the Yalu.

It would have taken a shoulder full of stars to get the call through, but a soldier with enough rank could have talked—by telephone radio relay and wire— from the Manchurian border to the White House through the facilities provided by the 4th Signal Battalion and the global net of the Signal Corps.

A communications center, even bigger than those established at Inchon-Seoul, was set up at Hamhung to handle up to 1,500 messages a day.

During the Inchon-Seoul campaign, the com centers there—using a variety of facilities—handled nearly 24,000 incoming and outgoing dispatches. The com centers at Wonsan and Hamhung, during a six-weeks period in the X Corps drive in North Korea, handled approximately 100,000 messages, almost equalling the output and intake of 8th Army facilities over a like period.

Dispatches ranged from five-word messages to others as long as five and six typewritten pages, newspaper copy, intelligence summaries, G-3 operational releases and the like.

Quick Reinstallation

The Hamhung center, similar to the General Headquarters com center at Tokyo, but on a smaller scale, had a wide range of message-sending facilities including radio-teletypewriter, radiotelephone, and extensive teletypewriter network covering the whole X Corps sector, which included half of North Korea, and a courier service to deliver its messages by air, motor and rail.

(Several of the couriers, "hitch-hiking" up the coast to deliver official mail to the Capitol Division, near the Siberian border, spent several days with the ROK troops and quickly acquired a taste for Korean soup and rice).

The establishment of a com center is one of the most important phases of the 4th Signal activities. Each time Corps headquarters moves, (and General Almond has leap-frogged his operations from one end of the country to the other since September) it necessitates the creation of a new com center —with no delay.

At Kyongju, a midnight fire razed the com center, destroying teletypewriters and other message equipment, burning telephone lines, and putting 4th Signal momentarily out of business. By dawn the switchboard had been reinstalled to handle telephone calls and by 6:30 o'clock in the evening, slightly better than 18 hours after the blaze, the com center was again in full operation.

There are times when the Signalmen

(*Continued on page* 70, *col.* 2)

Men of T&T Co., terminate local cable for the X Corps after fire in building disrupted communications. Circuits were reinstalled eighteen hours after fire.

Sylvania Subminiature Tube Program

Preface

The fledgling subminiature tube has suddenly acquired a position of tremendous responsibility. The utmost in miniaturization of electron tubes is demanded to satisfy space and weight limitations in modern military and industrial equipments. At the same time, extremely high performance and low failure rates are required to assure long and dependable operation with a minimum of servicing. Tubes must also be adaptable to large-scale high-speed production in order to keep up with current trends to utilize electron tubes for an increasing number of uses. However. due to the dynamic nature of the subminiature tube development program. applications and requirements are constantly a step ahead of the capabilities of present tubes. Unfortunately. the publicity attendant upon the development work may often exaggerate actual development. In order to obtain a comprehensive picture of the current status of subminiature tube development. it is necessary to consider all the aspects of the program —the history of the development. the requirements of various applications. the problems of design and of manufacture. the considerations of economic balance. and the aims of future plans. It is hoped that all these factors may be treated in this paper.

History of Subminiature Development

Comparatively small electron tubes. such as "peanut" tubes. were made for specialized usages more than twenty years ago. The first general activity in the field of subminiatures was in connection with their use in hearing-aid devices. In the beginning. both hearing-aids and the tubes were custom-made on a limited basis. and were relatively expensive. Initial attempts at commercial production of small tubes were begun late in the 1930's in conjunction with a program to make low-cost hearing-aids in mass production. At first. the hearing-aid tube was generally equivalent in size to a T-4 round bulb. and was made with a flat-press header. A flat-bulb design originated by Sylvania was later used because of its adaptability to the particular form of the hearing-aid units.

The greatest impetus to the further miniaturization of electron tubes was felt early in 1941. when tiny. rugged tubes were urgently needed for use in the proximity fuze. Strenuous efforts were applied to reducing size and mass of tubes, and to ruggedizing structures to withstand the high "G" levels experienced in gun-fired projectiles. The necessity for large-scale production also was realized at this time. Although fuze tubes were specialized types rather than prototypes of current subminiatures, this program presented the first instance of low-cost mass production of subminiaturized electron tubes. Manufacturing techniques developed at that time contributed a great deal to the continuing success of subminiature tube development.

The first tubes made for fuze applications incorporated the flat-bulb design of hearing-aid tubes. However. field test results indicated that this design was not completely satisfactory for gun-fired projectile use. and subsequent designs incorporated a cross-press type of header which. used in conjunction with a round bulb. permitted better support of tube elements. This type of tube was also more suitable to large-scale production. since it could be manufactured with only minor alterations of conventional automatic machinery.

Concurrently with the development of the cross-press type of subminiature. a wafer-type header was used experimentally and was felt to have potentialities as to ruggedness. high-frequency performance. etc. Although manufacturing techniques necessary to produce the wafer header in large quantities were not commonly used prior to the time that the war started. work in this field continued as part of the fuze tube development program. and the design was fully adapted to production within a couple of years.

Up to this point. the subminiature tubes discussed were all battery-operated filamentary types. Prior to the end of the war. engineers at Sylvania experimented with the use of an indirectly-heated cathode in subminiature wafer-type tubes. and several such types were developed by 1945. These types may properly be considered the predecessors of the present subminiature tubes. Indirectly heated cathode subminiature tubes appeared to be particularly applicable for use in such compact. high-performance units as guided missiles. radar. etc.. and the armed services showed considerable interest in further development of these types. Development work was necessarily limited until the end of the war. but this program expanded rapidly late in 1945.

It should be pointed out that tube performance requirements for various applications were even less accurately defined at that time than they may now be. principally due to the scarcity of available information on actual usage. As a result, there was not complete agreement in all fields as to the desired objectives of a subminiature tube development program. Three separate programs have been carried on at Sylvania, each under the sponsorship of a different government agency, and aiming toward different objectives and consisting of different tube types.

The first development was initiated late in 1945 under the sponsorship of the Applied Physics Laboratory of the Johns Hopkins University and the Bureau of Ordnance. The primary objective of this program has to design seventeen subminiature tube types which would be electrically equivalent to existing types of larger size. The change to a subminiature construction was desired to effect a significant reduction in size and weight of tubes with no loss in efficiency of performance. It was also expected that some mechanical advantage would be gained from the smaller size.

For many applications, however. it was evident that conventional tubes. regardless of envelope size. would not stand up under the particular conditions of operation. This situation had been recognized to some extent during the course of the war. and was reflected by government sponsorship of a program to ruggedize structures of conventional receiving tubes to withstand shock impacts encountered in such uses as fire-control devices. etc. It later became apparent that the modification of existing types was not the complete solution to the problem of the diverse requirements of increasingly complex equipment. but that a new type of design was needed.

The second development program was sponsored by the Bureau of Ships in 1947. The Bureau recognized that the need existed for a line of tubes which would be intrinsically superior to the conventional quality of receiving tubes in every respect.

A fundamental requisite of tubes for such uses as fire control was the ability to withstand a high level of impact shock without breakage or deterioration. For other applications. such as high-frequency communications equipment. it was necessary that tubes operate at frequencies considerably higher than those used during the war. For several uses in airborne and vehicular equipment. it was desirable that tubes be operated from the convenient 26.5-volt battery supply. using this voltage for heaters as well as for plates and grids. Long life and extremely low failure rates were also

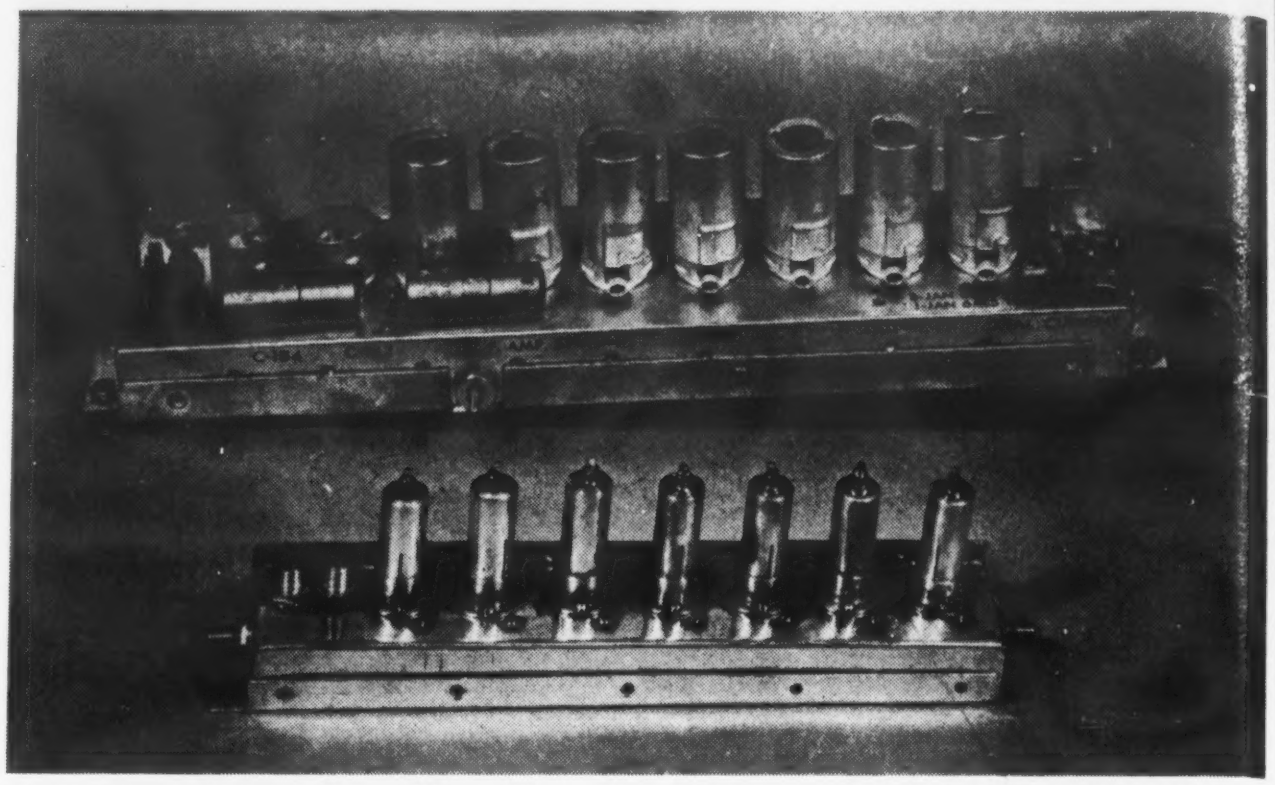
required to assure dependable performance of all units using large number of tubes. This program included the development of 14 different tube types to satisfy these requirements.

The third program was sponsored by the Air Materiel Command, who realized that a parallel situation existed in regard to the use of electron tubes in their equipment, but that some specific qualities desired in the tubes were of a different nature. An important consideration in development of tubes for airborne units was the effect of high ambient temperatures upon tube performance. In addition, it was desirable that tubes incorporate the long life, shock resistance and high-frequency capabilities requested by the Bureau of Ships, and that some type be suitable for 26.5-volt operation. This program included eight tube types to AMC specifications.

These three development programs at Sylvania overlapped in several instances, and all made significant contributions to the present "premium" tube line. Advances made on any specific type were incorporated wherever else they were beneficial, with the result that all programs were mutually advantageous. As work continued on all the tube types included in these programs, plus several other types commercially developed by Sylvania, it was realized that it would be advantageous to consolidate all subminiature tube types which would contain all the factors or reliability of the separate development programs. The present line of Premium Performance Subminiature Tubes represents the subminiature designs achieved as a result of this work to date.

Design and Production Factors

A wafer-type header has been used exclusively for cathode heater-type subminiatures because of its many advantages. Of prime importance is that wafer-header tubes are more adaptable to high-speed production as a result of the eliminations of jigs, fixture or holding devices usually needed with press construction for maintaining lead spacings during mounting and sealing. The wafer stem also permits a reduction in tube length over press constructions, and a greater flexibility of tube design. In addition, it makes possible wider spacing between leads, which contributes to better performance at high altitudes, high temperatures and high frequencies, and reduces both internal and external leakage problems. Further advantages include a lower heat input required for sealing, press chipping in handling, and increased resistance to thermal shock. The addition of an annual ring of glass at the bottom of the wafer helps to shield the leads from sealing fires, and prevents sharp bending of leads. The projection of this ring also permits tubes to seat in a T-3 socket in only one position, without rocking.



Comparison of sizes of amplifier strips using miniature and subminiature tubes. Use of subminiature tubes permits great savings in size and weight.

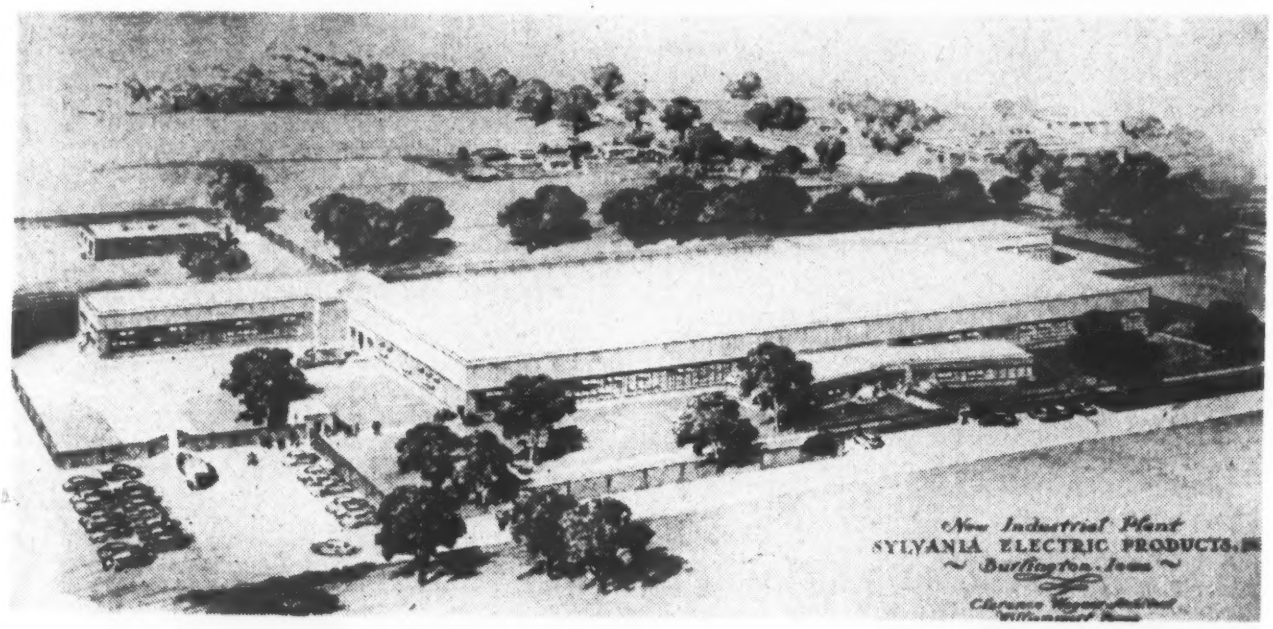
A folded single-coil type of heater is used in these "premium" subminiature tubes in order to minimize failures from shock, vibration or on-off cycling of heater voltage. This type of heater permits the use of larger wire than in equivalent folded-wire type heaters, and is therefore less subject to burnout. Performance of the 6.3-volt coiled heater shows excellent results, with the majority of sample tests going to 75,000-100,000 on-off cycles without a failure. For the 26.5-volt heater, where low current requirements necessitate the use of exceedingly fine wire, a method has been devised to wind the coil over an insulated supporting rod which is left within the heater to lend added strength. The quality of 26.5-volt coiled heaters has shown a marked improvement as development work progressed, with tests showing a scattered incidence of failures starting in the order of 15,000 on-off cycles.

A seamless oval cathode is used in these tubes to obtain several advantages. The oval design permits the use of a shorter length than an equivalent cylindrical cathode to obtain the same amount of cathode area, thus increasing resistance to shock. The oval cathode also makes possible the use of oval grids, which do not require forming and therefore can use tungsten for lateral wires. As a result, it is possible to utilize smaller diameter wires and higher pitches to achieve a higher value of transconductance per milliampere of plate current. In addition, the resulting mount configuration achieves short and uniform electron transit time, thus enhancing high- frequency performance.

The level of vibration noise in these subminiature tubes has been minimized by restricting both movement of the mount and individual motion of the parts with respect to each other. Mount movement has been minimized by using a pointed-outline mica which is designed to provide a close fit within the bulb. Relative motion of the parts has been lessened by reducing the size of mica holes to tighten elements, particularly in the case of cathode and No. 1 grid holes. An extensive quality control system has also been installed to assure that close tolerances are maintained on parts and spacings, and that all parts are securely fastened in place.

The subminiature structure possesses

New Sylvania plant, Burlington, Iowa, devoted exclusively to production of subminiature tubes.



inherent advantages for shock applications as a result of the short mount length. A further contribution to shock resistance was made by increasing the cathode wall thickness, which eliminated bowing of cathodes and effectively reduced slup of cathodes activity as a result of shock. Additional improvement has been effected in reducing shorts by swaging grid side rods to prevent distortion of end grid turns both during mounting and during shock.

Subminiature tubes are also intrinsically superior for high-frequency performance, due to the short mount structures and short lead lengths to the mount, both of which contribute to lower inductances and inter-electrode capacitances. The transconductance-to-capacitance ratio of the tubes is further increased by the arrangement and spacing of leads in the circular pin wafer header.

The effects of high operating temperature of parts (due to the dissipation of conventional amounts of energy within a limited space). and because of the high ambient temperatures generated in compact equipments. In order to minimize the evolution of gas from parts of high temperatures, all parts are de-gassed as much as possible before assembly. Steps are taken to achieve a better vacuum in the tubes by introducing a special flush in sealing to prevent or remove oxidation prior to exhaust, by incorporating individual oil-diffusion pumps on each port of exhaust machines. and by re-flashing getters immediately after seal-off. The adverse effects of high temperatures upon the glass are minimized by using a specially-processed low-electrolysis glass for both headers and bulbs. Tendency toward electrolysis in the lead wire seals is further reduced by the wider lead spacing of the circular pin arrangement of the base. which produces a better strain pattern in the glass, thus increasing resistivity.

The incorporation of these design improvements in premium subminiature tubes results in increased reliability of performance which is reflected in the 5000-hour life expectancy rating. Thus rating is used in the same manner as the conventional 500-hour life rating on receiving tubes. and means that the JAN average life percentage of any group of tubes run at rated life-test conditions for a period of 5000 hours will be less than 80%.

Tube Applications

If the "premium" features of these tubes are to be fully realized, a reasonable amount of care must be exercised in equipment design. Each type should be used only for the purpose for which it is intended. and only within the rated limits of voltages and currents. Consideration should be given to the incorporation of heat removal techniques in compact units, in order that maximum bulb temperatures will not be exceeded. Care must also be taken in mounting tubes, whether leads are soldered to circuit components or subminiature sockets are used. Where tubes are to be subjected to severe shock and vibration, the bulb must be supported firmly by a shield or a clamp. The reliability of tube operation in any application will reflect the attention paid by the equipment designer to the limitations of tube performance specified by the tube manufacturer.

Testing subminiature tube performance; Mechanical effects of vibration are observed with aid of stroboscopic light. Electrical effects are measured with lead wires dipped in small pools of mercury.

Economic Factors

The economic considerations entailed in the production of high-quality, reliable subminiature tubes have been a serious deterrent to the expansion of this program. Until very recently, the market for those tubes was so small as to furnish little incentive to tube manufacturers to invest millions of dollars in engineering time and in equipment for production. Although demands for these tubes are increasing rapidly, there is still some resistance to the high cost which currently results from the unusual conditions of manufacture. Production thus far has been on a limited scale, both because of the relatively small market and because development work was still in progress. As a result, manufacturing efficiency has been low and tube loss has been high. In addition, extra personnel are required to check the quality of raw materials, to inspect parts and assemblies, and to test finished tubes for the numerous "premium" features of tube specification. Additional time is required for extra processing of parts. These increases in cost must be reflected in sales prices.

There is currently an increasing field of applications where the need for the "premium" features of these subminiatures warrants the higher cost. If the market for these tubes expands sufficiently, and continuous large-scale production becomes practicable, prices will go down. Increased efficiency of large-scale production will also result in improved overall quality of premium subminiature tubes.

Future Program

The subminiature electron tube development discussed here is by no means a complete and finished job. It always has been, and remains, a dynamic program, progressing in response to the needs of the industry. Programs for further development are proceeding along several lines. In addition, the investigation of tube reliability factors is being continued, including a study of tube performance under various conditions of operation and an analysis of failure causes.

Development of improved subminiature tubes can be facilitated if equipment designers work in close contact with tube manufacturers. The tube designer's job can be accomplished more efficiently, and more satisfactorily, when sufficient data are provided concerning the circuit functions of a tube. Continuing improvement of tube quality can also be effected if data are furnished as to actual results of field applications. The tremendous progress of the past ten years may be accelerated in the future if close correlation can be maintained betwen tube design, production and final application.

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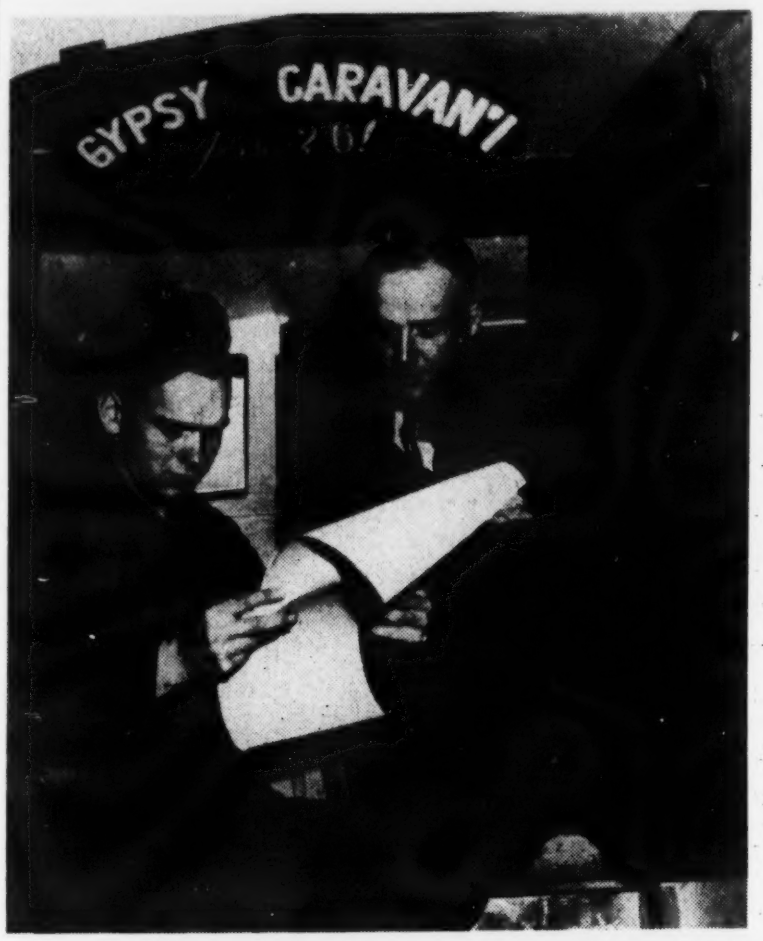
Above: Sending message via teletypewriter inside new ANGRC-26 truck, Taegu.



Above: Checking tape against copy. Below: ANGRC-26 radio teletypewriter in operation from ASCOM City to Pusan, Korea.

Lee lost the battle of Gettysburg, some historians say, because of poor communications. He badly needed his cavalry, which was making a reconnaissance behind the Union lines, but there was no way to contact them. Had he gotten their support and the information they had gathered, he might have won.

Today the Signal Corps' biggest job is to see that no American general loses a battle because of poor communications. Recently it has developed and battle-tested one of the finest pieces of communication equipment in twenty years, a mobile radioteletypewriter station.

This set, known as the AN/GRC-26, has been successfully operating in Korea for the past five months. It is compact, easy to set-up, easy to operate, and as trouble free as any equipment of its type. The entire set is mounted on an ordinary 2½ ton Army truck with a two-wheel trailer carrying a gasoline driven generator. Inside the van two or three operators can work in comfort with forced draft ventilation in summer and an electric heater in winter. Two teletypewriters send and receive messages simultaneously at the rate of 100.000 words a day, and a radio telephone permits conversation between sets at any time. The entire unit can be quickly detached from the truck bed, placed on the ground or aboard ship or inside the C-119 cargo plane.

The AN/GRC-26 is a rugged piece of equipment. It will go anywhere the truck can take it and stay in operation. Four sets went ashore at Inchon on D plus 6 days, and had they been combat loaded they could have just as easily rolled ashore on D day. One unit went with the 7th Division in its attack south from Inchon to Suwon and back toward Seoul. Another unit was flown to Wonsan to provide communication for X Corps Advance. Still another unit was sent to I ROK Corps.

One experienced communications officer found its toughness amazing. He had thought the set wouldn't last very long over the dusty, rough Korean roads.

"I've never seen anything like the AN/GRC-26," he said. "We drove it around for as much as 45 miles at a stretch. We gave it the worst beating I've ever seen given to a piece of equipment in its class. But when it came up for test, it worked. I don't know how, but it did."

Volumes at High Speed

It is one of the "surprise" technical weapons to come out of the Korean war. Mobile radioteletypewriter stations had never been successfully tried in World War II. The equipment used for radioteletypewriter operation then was too bulky and too heavy. Before the AN/GRC-26 was tried out some people doubted it could do the job called for in Korea, which is one of the worst countries in the world for radio transmission. It is mountainous and minerals in the soil absorb most of the radio ground waves. Before the war amateur radio operators in Seoul and Pusan found it difficult to contact each other and they often relayed messages through other amateur stations in Tokyo.

But the AN/GRC-26 did the job. At Wonsan, the X Corps had 3 channels to GHQ in Tokyo, 1 channel to 8th Army, 1 channel to the 7th Division and 1 channel to ROK Corps—all of them mobile radioteletypewriter circuits.

It has solved the problem of handling volumes of messages at high speed. For the days when a general and his staff could utter a single word "Attack!" disappeared with the horse cavalry and the campaign hat. Today the length of the average military mes-

(*Continued on page 70, col. 1*)

CHURCHILL

Cabinet Company

President S. T. Gullicksen of Churchill Cabinet Co.

Churchill Cabinet Company originated in the year of 1904, on the Northwest side of Chicago in what was then a sparsely settled community.

The name "Churchill" was derived from the name of the street upon which the factory building was located.

The very first order entered on the books of the company was one from the Automatic Electric Company of Chicago for telephone communication boxes, and it is interesting to note that the name of the Automatic Electric Company still appears on their books as a valued customer. However, this is not unusual in that more than fifty percent of "Churchill's" accounts have been on the books for twenty-five years and more. Many of these names are outstanding ones in the electronic and telephone fields today. Such as Western Electric, Graybar, Stromberg-Carlson, Kellogg Switchboard, Leich Electric, Cook Electric, Teletype Corp., Hallicrafters, and many more; this in itself certainly must attest to the sound relationships kept up over their many years with these many fine companies.

Although "Churchill" manufactures all and any type or kind of woodwork, in volume, under contract, for the electronic and other industries, they are probably best known as the outstanding manufacturer of telephone booths, many thousands of which are in use today by the Bell Telephone System as well as most all independent telephone systems.

The company manufactured during World War II more than eighty different types of wood chests and other wood components for various branches of the service, principally, however, for Signal Corps. Not only on a direct contract basis, but as suppliers to holders of prime contracts as well.

At the present time and during the Korean situation, they have been and are manufacturing practically the same types of wood chest, etc., as they did during the war years.

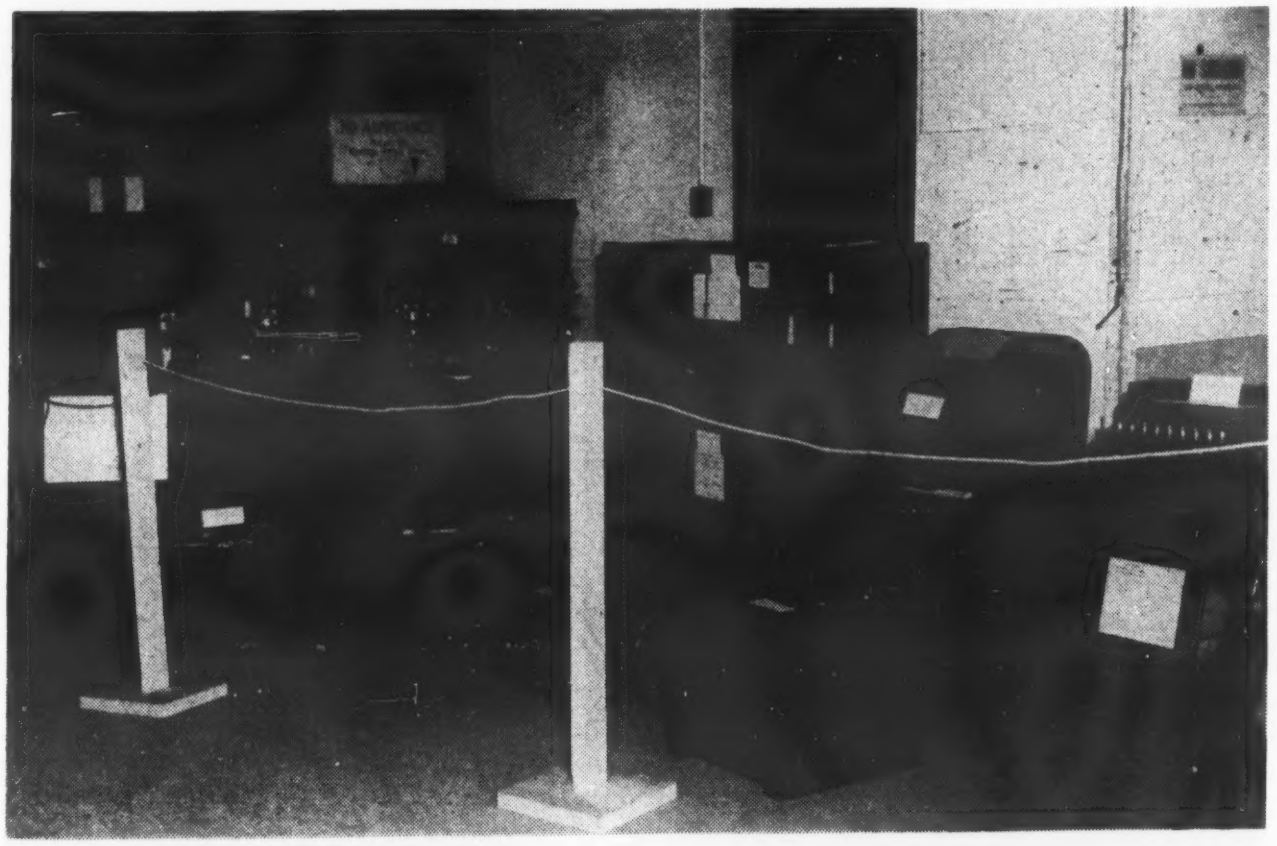
The "Churchill" plants are equipped with the very finest and latest type of woodworking equipment, including electronic gluing processes and so forth. They also kiln dry all their own lumber, thereby assuring the ultimate end use.

The company was founded by Ole Gullicksen, one of the century's outstanding woodworkers, and now is headed by his two sons, Spencer T. and Willard A. Gullicksen, who have spent more than a quarter of a century associated closely with their father in the woodworking business.

In passing it is to be noted also that this company is and has been manufacturing some of the outstanding television and radio cabinets of the better quality for such concerns as Motorola, Hallicrafters and Andrea Television, just to mention a few.

The company is proud indeed of its membership in the Armed Forces Communication Association, and likewise proud of its association with so many of the A.F.C.A. members both socially and in business.

A group of various types of wood chests manufactured for Hallicrafters, Leich Electric and Teletype Corporation and others.



No. 100 Series telephone booth.

THE MUTER

In the mid-west, heart of the nation's electronic industry, The Muter Company successfully combines two extremes; diversified components production maintained at a top-quality level and the coordination of a highly competitive manufacturing group for their own collective and individual benefit.

Leslie F. Muter, president of The Muter Company, who entered the electronics business in 1921—when radio components were sold largely in chain stores—manufactures nearly all of the 100 types of electronic components used in television and radio sets.

This variety of production which requires highly specialized techniques, is possible because he maintains three manufacturing plants. The Muter Company, parent to the Jensen Manufacturing Company in Chicago and the Rola Company in Cleveland, makes fixed wire wound resistors, precision potentiometers, IF and RF coils and transformers, leaf and slide switches, relays and special switches and other special components along the lines of capacitance, inductance and resistance.

The Muter Company has always been in Chicago but was once known as The Compo Manufacturing Company. It made "Candohm" resistors. "Candohm" was the Compo name for what was then an entirely new type of wire wound resistor, the first to be metal clad for protection against atmospheric conditions.

The factory was located on Chicago's southwest side until 1930 when they moved to a larger building at 1255 South Michigan in order to expand into the production of other types of radio components. The company is at this same address now, occupying 50,000 square feet situated just out of the business area known as "The Loop."

In 1939 Leslie Muter made the first of his purchases of company stock and assets when he bought the capital stock of the General Manufacturing Company, producers of coils. He moved the equipment into his own factory and added coil manufacture to his list of precision components.

Everything which The Muter Company makes is fabricated from the raw materials in order to control uniformity of design and quality. They have their own machine shops and employ wire, steel, bronze, bakelite, tin and ceramic materials in production. All of their components are made to manufacturer's specifications and their list of customers include among others, Admiral, Crosley, Hoffman, Delco, Dumont, General Electric, Motorola, R.C.A., Philco, Westinghouse, Zenith, and of course, military production according to government specification.

Muter relays are built for standard and special applications.

Both of the other companies which Muter now owns were successful in their own names and have continued to increase in importance in the industry. The first acquisition was The Rola Company in 1945, followed by The Jensen Manufacturing Company in 1948. Both companies are well known as producers of loudspeakers and allied auto accessories. Total personnel of the three factories is approximately 2,000 and there is 230,000 square feet of floor space in all. Each factory has its own management, engineering staff and laboratories.

These additional plants were added in order to meet production demands of the television market as TV sets require 4 to 5 times the components of a radio set and as the higher voltage demands parts of better, more accurate quality.

The Jensen Manufacturing Company lists as its specific products, high-fidelity loudspeakers of both standard and specified types and a complete line of mass production speakers, field coils, transformers, audio networks, chassis assemblies and other audio accessories serving 45 different fields of application. Unlike Muter which sells only to manufacturers, Jensen also maintains a large parts distributor business.

The Rola Company makes a complete line of loudspeakers ranging from five to twelve inches in size, in either electro-magnetic or permanent magnet types. They also make transformers, filter reactors, vertical output transformers, vertical blocking oscillator transformers, deflection yokes and horizontal deflection transformers.

During the years when Les Muter was achieving prominence as a manufacturer he was also contributing perhaps more towards solidifying and stabilizing the entire industry than any other independent manufacturer. Twenty years ago, when electronics was largely an industry serving the radio field only, few of the men who were then in the business realized that the electronic era could have its nucleus in the mid-west only if they worked together to keep it there. Many electronic manufacturers who started on the west coast and then moved to the Chicago area because of better transportation facilities and supply sources found that labor problems and other production

STORY

By Jean Campbell

difficulties peculiar to their new industry could not be handled individually. However, they were inclined to try to handle them as individual problems because they were a highly competitive group of men.

One of the first of these major crises occurred when the NRA came into existence. The set manufacturer and the parts manufacturer found he must have help in order to deal with government rulings. Consequently, when the Code supervisory agency for radio parts and accessories for home entertainment under NRA was formed, the chairman was Leslie F. Muter, selected as the industry advisor and spokesman because of his already outstanding efforts to unite and clarify industry aims.

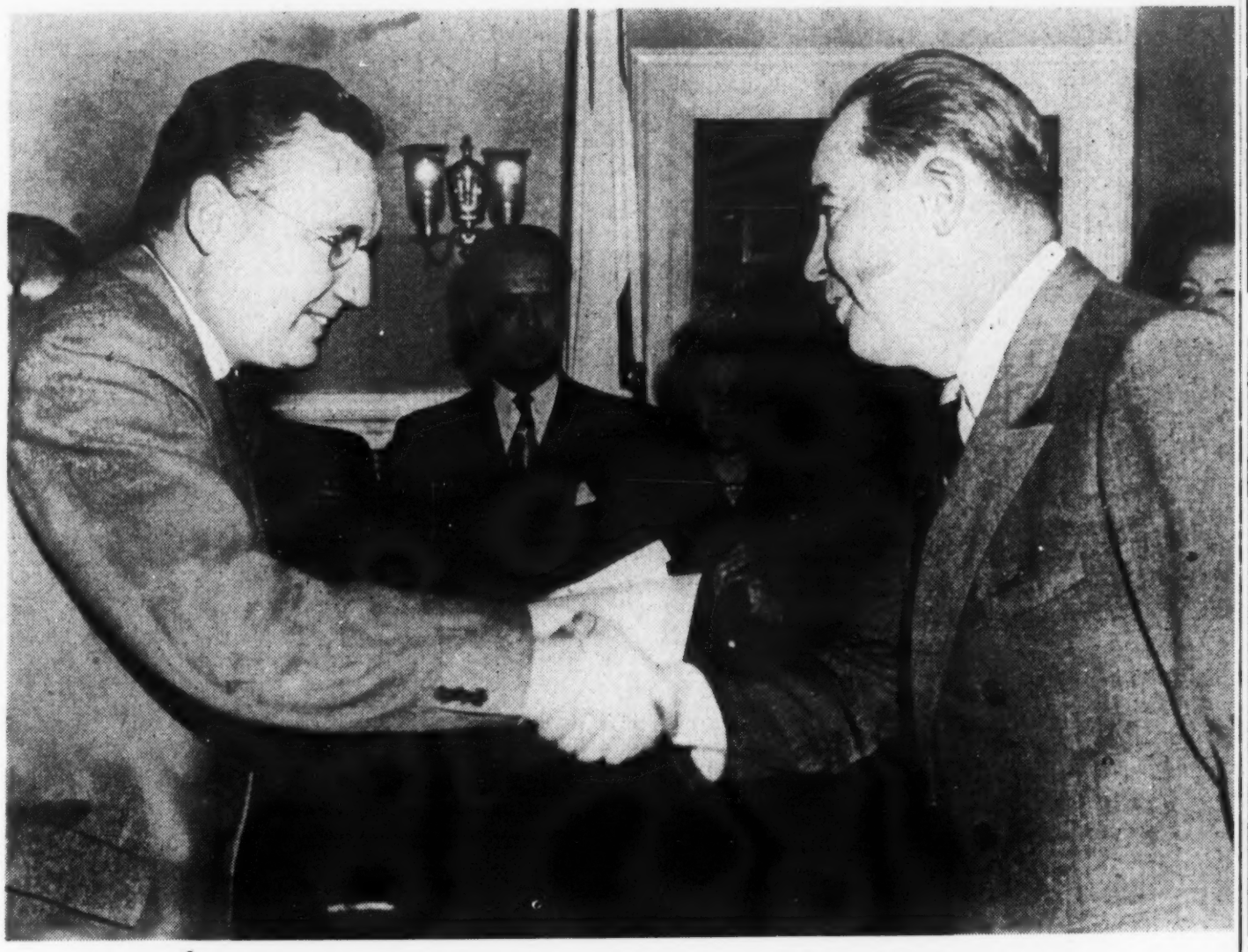
At that time, he was president of RTMA (then RMA). This is an organization of sets and parts manufacturers and he was one of the first members. At the time of its organization the board of directors consisted of two set manufacturers and five parts manufacturers.

Les Muter served as president of RTMA for four terms, from 1934 through 1937 and is now treasurer, a position he has held for 17 years

Again, during 1942 the industry was confronted with a problem. This time it was war. Every manufacturer who had or could get the facilities naturally wanted to get into war production. However, low wage rates made electronic employment the least attractive of all industries to the war workers and procurement of materials was a constant problem. Therefore, Radar-Radio Industries was formed, to show manufacturers how they could gain recognition through organization and to anlayze and help direct production policy so that they could offer a service which would be beneficial to the war effort and to themselves as well. It was a complete success and recently was reactivated in order to aid in the current defense effort. Mr. Muter acted as President during its wartime activity and retains that position in its new program.

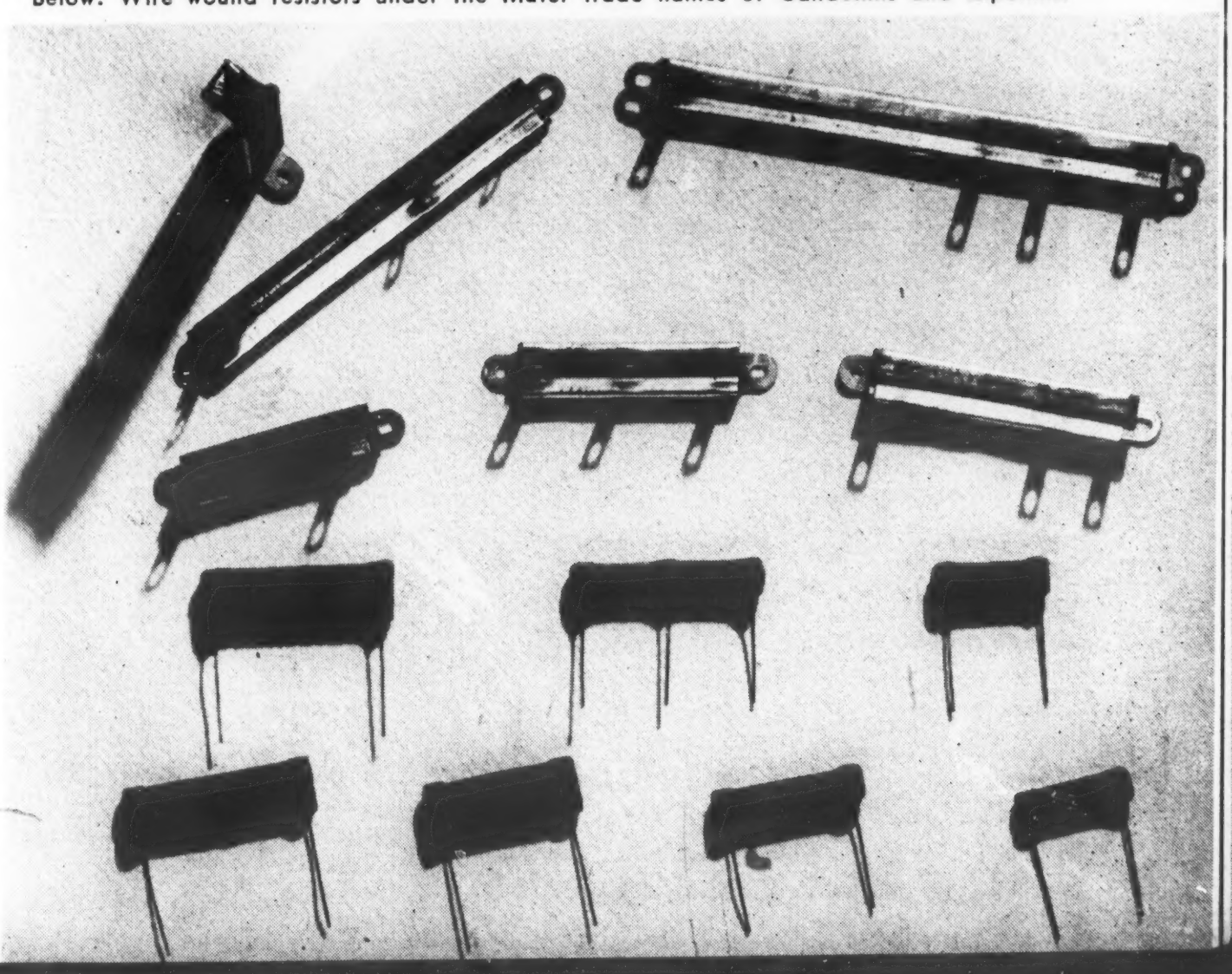
At the close of World War II Leslie Muter received a presidential citation because of the benefit Radar-Radio Industries had been to the war effort throughout its activity.

Thomas A. White, president of the



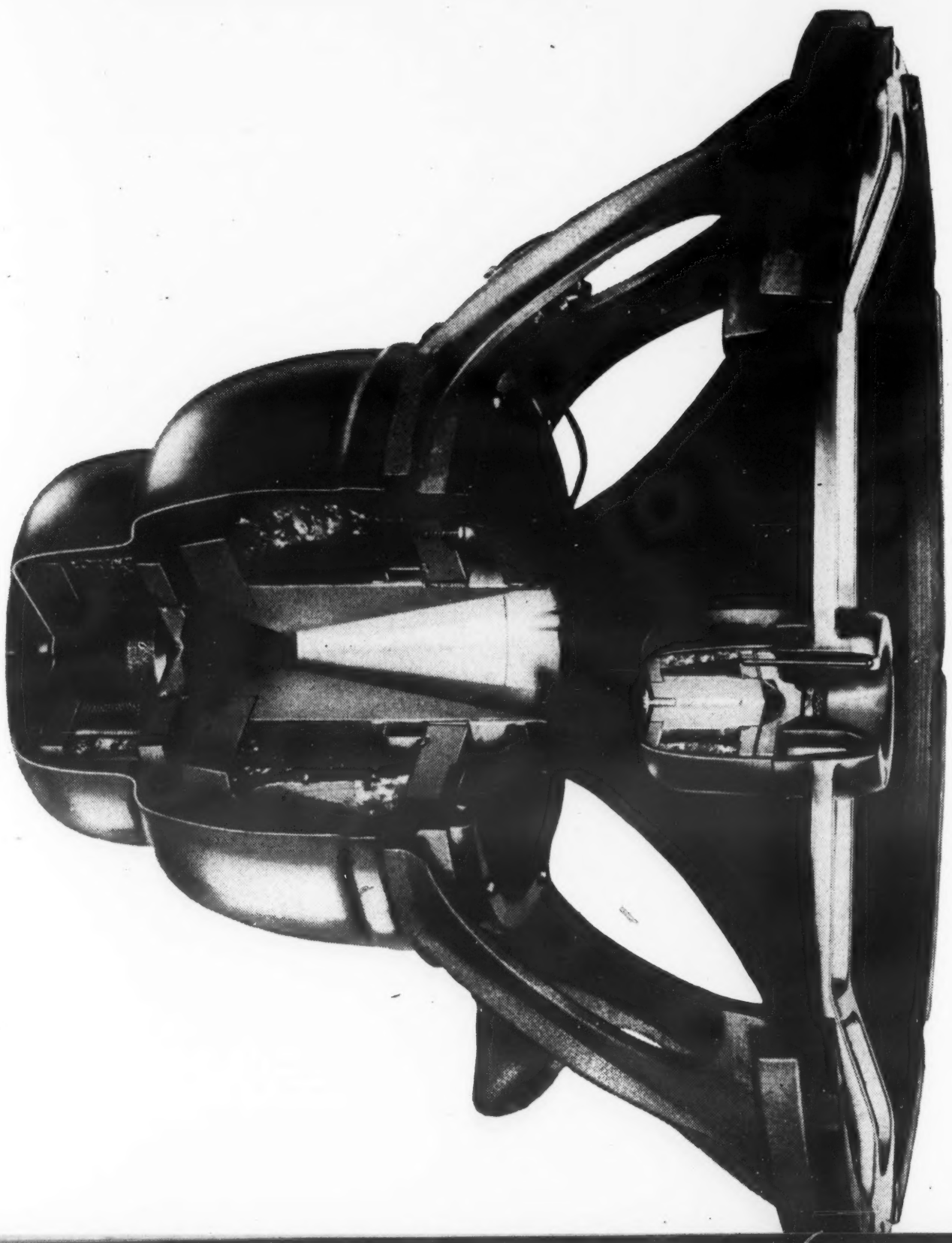
Above: Leslie F. Muter, left, president of the Muter Company receiving Presidential citation for his contribution to electronic production coordination as president of Radar-Radio Industries during World War II. This recently reactivated organization has Les Muter as its president now.

Below: Wire wound resistors under the Muter trade names of Candohms and Zipohms.



President of Rola Co., Laurence King

President of Jensen, Thomas White



Cutaway of Jensen's G-610 Triaxial, first integral three-way loudspeaker system spanning the frequency range of the ear.

Jensen Manufacturing Company, which Muter purchased in '48, has also been noted for his interest in industry policy. An active member of RTMA, he was one of its original members. He has been with The Jensen Manufacturing Company since it was organized in Oakland, California by Peter Jensen, a Danish engineer who brought to this country one of the first of the dynamic loudspeaker developments.

The company was moved to Chicago in 1929, to what is known as "The Clearing District," an area of industrial plants minutes away from Chicago's Midway Airport. Since 1929 they have increased their plant footage 200% until now they occupy 91,000 square feet in a modern, one-story structure specially designed for speaker development and production. Methods for both mass production and skilled bench work craftsmanship give scope and flexibility to the Jensen line of speakers.

They have always been a company noted for advanced design in high fidelity. Jensen "firsts" include: the first high-efficiency direct-radiator loud-speaker with high power rating, first permanent magnet loud-speaker manufactured in the U. S., development of bass-reflex (vented) enclosure. The name, "Bass-Reflex" was originally a Jensen trade name but has since been

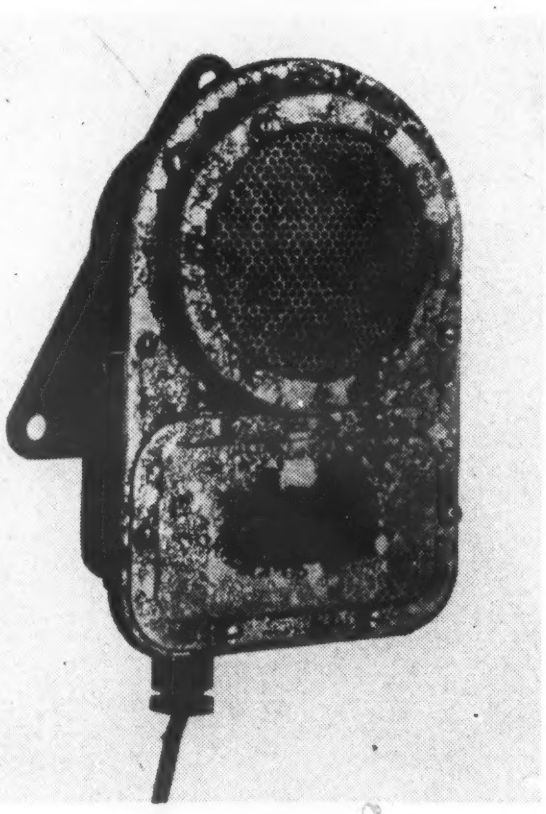
dicated to the public domain. Jensen was the first to develop and apply molded diaphragms, had the first loudspeakers in 15 inch and 18 inch sizes, the first commercial coaxial two-way loudspeaker, the first articulated horn and diaphragm for unitary two-way systems and made basic advances in horn theory including formulation of the Hypex family. The Jensen G-610 triaxial loudspeaker was the first integral three-way loudspeaker system and the first high-quality low-distortion loudspeaker spanning the frequency range of the ear.

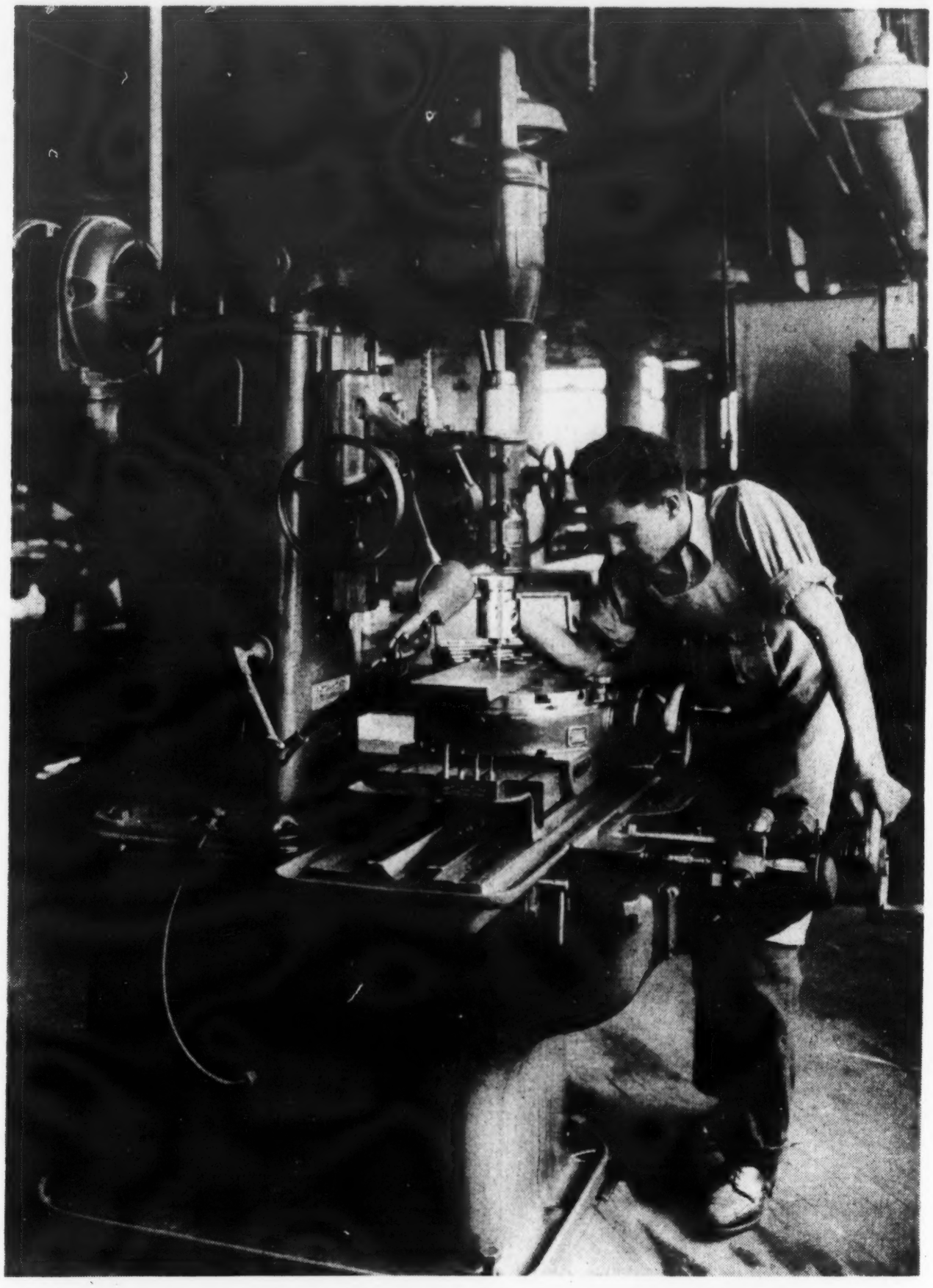
During World War II Jensen produced speakers for the United States Navy and Signal Corps. The company is tooled for and is producing newly established types of military loudspeakers. Because of their dependability in the field, thousands of Jensen speakers served in World War II, or with only slight modification. They have facilities for producing transducers, headsets, electro-mechanical devices and audio transformers, networks, filters and the like.

Jensen was the only speaker company whose facilities were predominantly taken up by loudspeaker production for the military during the war.

Their engineering assets and facilities include 104 man years of experience in loudspeaker engineering, eight degrees among the 10 engineers, ranging from B.S. in E.E. to M.S. and E.E. and an additional 38 man years collective audio and communication experience. The laboratories are equipped with facilities for acoustical measurements for free field, live room and transmission line measurements comparative listening tests; magnetic, electrical, mechanical impedance and shock and vibration testing. A materials testing department includes a salt fog chamber, humidity chamber and ovens to 1600°F. A model shop with the full facilities for experimental work is maintained.

Jensen loudspeaker taken from bombed "Franklin" carrier, weathered heat, bombbast and still operated.





Rola factory worker uses a Pratt & Whitney jig-borer for a customer specification job—one with high precision requirements.

Laurence King, president and general manager of Rola joined that organization when Leslie Muter purchased the company in 1945. He came there from Operadio where he had worked for 20 years, first as sales manager and then as general manager. Rola, like Jensen, was started in the west and then moved to the mid-west in the late twenties. At present, they are making approximately 12,000 speakers per day plus other TV and radio components. Their Cleveland factory is located in the Art Craft Building where they lease six floors for their six different departments of operation.

One of the outstanding features of the Rola plant setup is their separate auxiliary factory, a few blocks from the main plant where they do secret, military contract work. All during World War II this separate building was used for this. Their entire production during the war years was converted to highly technical precision transformers, headsets, headset adaptors, microphone switches, hydrophones used in Sonobuoy equipment and six channel oscillators for controlled pin point bombing. They have a record of 31 years in production of loudspeakers for special and mass order.

The Muter Company, combining as it does, the assets of three engineering laboratories, three modern plants equipped to control quality of production so that it can't miss in giving the best in electronic performance, is directed by a man who is outstanding as a manufacturer and as a leader in directing the energies of his industry, whether in peacetime or national crisis.

From The President

In his final message as chief executive of the AFCA, President Halligan thanks the members for their support during his tenure of office, and urges that the same support be given the new president to be elected at coming annual national meeting in Philadelphia, April 24-26.

The sixth anual convention of our Association will be held in Philadelphia on April 24, 25, and 26, 1952. For many weeks the members of the Philadelphia Chapter have given generously of their time and effort to plan a program deserving of your support and attendance —a program which will include open house at Signal Corps, Navy, and Air Force Procurement offices; a forum discussion on military-industrial relations regarding procurement and production problems; and demonstrations by our Navy host.

Those of you who have attended past conventions know that the host chapter leaves no stone unturned in presenting a program that is educational as well as enjoyable for the members and their wives.

Since this is my last letter as President of the AFCA, I want to take this opportunity to thank the headquarters staff of the Association for their wholehearted support during my term of office. I also want to thank all of the members for their cooperation in carrying out the aims of the AFCA during the past year.

Group, individual, and student memberships have continued to increase. At the same time, advertising space and circulation of SIGNAL have also increased. But our Association is still young and your help is needed if it is to continue to grow.

I feel confident that the new national president of the AFCA will get the same kind of support which you have so willingly and unselfishly given to your officers and staff this past year. You can do your bit by bringing in new memberships. As we grow bigger in number we grow stronger as an Association. We cannot repeat too often the importance of a strong relationship between the Armed Forces and Industry in our field, communications - electronics - photography.

Thank you again—all of you—and particularly George Dixon, for making this past year as President of the AFCA one of the most memorable years of my life. I shall look forward to seeing you at the convention in Philadelphia.

W. J. Halligan

ASSOCIATION AFFAIRS

COMMUNICATIONS • ELECTRONICS • PHOTOGRAPHY

Convention Plans Set

Floberg, Fleischmann Speakers

Final arrangements for AFCA's 1952 annual meeting at Philadelphia have been made, with the principal speakers announced as being Assistant Secretary of the Navy for Air John F. Floberg for the annual dinner, and NPA Administrator Manly Fleischmann as keynote speaker at the first day luncheon. The dinner and luncheon, and the business meetings, will take place at the Bellevue-Stratford Hotel in downtown Philadelphia.

Change of Site for Navy Show

One change in arrangements has been announced for the Navy host's place of displays and demonstrations. Originally planned for the Philadelphia Navy Yard, it has since been decided that the Naval establishment of most interest to the AFCA visitors would be the Naval Air Development Station at nearby Johnsville, Pa. Johnsville is about an hour's bus ride from the Philadelphia downtown hotel district, and transportation will be provided.

Card Return Urged

The convention committee is strongly urging that members who plan to attend the convention should fill out and return as soon as possible the card which was mailed to them. Returns are coming in in large numbers, but on the basis of average convention attendance there are many more yet to come. The final reservation form is mailed only to those members who have indicated on their returned card that they will attend. Exceptions are the members of the Philadelphia Chapter and other chapters nearby the convention city, such as Washington, Baltimore, New York, etc.

New Cards Can Be Had

If you have misplaced or lost the card which was mailed to you, another may be obtained by writing to Colonel Robert G. Swift, Secretary, AFCA Philadelphia Chapter, 1835 Arch Street, Philadelphia 3, Pa.

Ladies' Attendance Stressed

The emphasis on greater attendance by the ladies of the Association, including those of the members' families, has shown gratifying results in the number who are planning to attend this year, as indicated on the returned card forms. However, attendance by the ladies is still stressed, and members who are still making their convention plans are urged to "bring her along."

Mrs. Victor K. Cohen, wife of the

AFCA CONVENTION PROGRAM
April 24-26, 1952

Thursday—April 24

9:00-10:00 A.M.	Registration.
10:00-12:00 A.M.	Council and Directors Meetings (open to all).
12:00-2:00 P.M.	Keynote Luncheon.
2:00-5:00 P.M.	Forum—Subject, "Are Military-Industrial Relations On Procurement and Production Problems Satisfactory?"
7:00 P.M.	"Get Acquainted" night—Philadelphia area AFCA industry members will host all visiting members with a Buffet Supper, Refreshments, and Entertainment.

Friday—April 25

10:00 A.M.	Chapter Presidents' Meeting (open to all members).
10:00-12:00 A.M.	Open House—Signal Corps, Navy, and Air Force Procurement offices.
12:00-5:00 P.M.	U. S. Navy Program—Lunch and Demonstrations at Naval Air Development Station.
6:00-10:00 P.M.	Cocktails, and The Annual Banquet.

Saturday—April 26

Arranged tours as indicated by survey.

Note:—Special programs have been arranged for Thursday and Friday for ladies visiting the convention.

president of Victor-Bernard Industries, Inc. of Philadelphia, is chairman of the convention ladies committee, and her group has made special plans for greeting the visiting ladies and providing entertainment for them. In addition, wives of Signal Corps, Navy, and Air Force officers have formed special committees to give attention to ladies at the AFCA national annual meeting.

Again we urge, get that card in *now*. Don't miss the meeting if you can possibly make it, for a great time is in store for you. Get to Philadelphia on April 24, meet and talk with your fellow members at the big "Get Acquainted" night, on the opening day of the convention, where you will be hosted by the AFCA industry members in the Philadelphia area who are providing for you a program which will include refreshments, a buffet supper, and entertainment.

1951 Contest — Chapter of the Year

Chapters in the lead at the close of the 11th month of the contest on February 29th were:

	Points		Points
Gulf Coast	39.66	Seattle	15.23
Kentucky	35.74	Pittsburgh	14.17
Chicago	18.83	Baltimore	13.65
Rochester	17.58	Philadelphia	12.84
New York	15.84	Washington	12.78

AFCA GROUP MEMBERS

Communications—Electronics—Photography

Listed below are the firms who are group members of the Armed Forces Communications Association. By their membership they indicate their readiness for their share in industry's part in national security. Each firm nominates several of its key employees or officials for individual membership in AFCA, thus forming a group of the highest trained men in the electronics and photographic fields, available for advice and assistance to the armed services on research, development, manufacturing, procurement, and operation.

Acme Telectronix
Admiral Corporation
Allied Radio Corporation
Altec Lansing Corporation
American Cable & Radio Corp.
American Institute of Electrical Engineers
American Phenolic Corporation
American Radio Institute, Inc.
American Radio Relay League
American Steel & Wire Company
American Telephone & Telegraph Co.
Anaconda Wire & Cable Company
A. R. F. Products, Inc.
Andrews Corporation
Argus Cameras, Inc.
Arnold Engineering Company
Astatic Corporation
Automatic Electric Company
Automatic Electric Sales Corp.
Baltimore News Post
Barry Corporation, The
Bell Telephone Company of Pa.
Bendix Radio
Bergsma Brothers
Bliley Electric Company
Breeze Corporation
Burnell & Company
California Water & Telephone Co.
Capitol Radio Engineering Inst., Inc.
Carolina Telephone & Telegraph Co.
Central Radio and Television Schools
Chesapeake & Potomac Tel. Co.
Churchill Cabinet Co.
Cincinnati & Suburban Bell Tel. Co.
Collins Radio Company
Columbus Process Co., Inc.
Copperweld Steel Company
Cornell-Dubilier Electric Corp.
Corning Glass Works
Coyne Electric School, Inc.
Croname, Inc.
C. R. Daniels, Inc.
Da-Lite Screen Co., Inc.
Diamond State Telephone Co.
Drake Manufacturing Co.
Dukane Corporation
DuMont, Allen B., Laboratories, Inc.
Eastman Kodak Company
Electronic Associates, Inc.
Espey Manufacturing Co., Inc.
Federal Mfg. and Engineering Corp.
Federal Telephone & Radio Corp.
General Aniline & Film Corp.
General Cable Corporation
General Electric Company
General Instrument Corp.
General Insulated Wire Works, Inc.
General Telephone Corp.
General Transformer Co.
Gilfillan Bros., Inc.
Globe Wireless, Ltd.
Graflex, Inc.
Gray Manufacturing Co.
Guardian Electric Mfg. Co.
Hallicrafters Company
Haloid Company
Hazeltine Electronics Corp.
Heinemann Electric Company
Hercules Motor Corp.
Hoffman Radio Corp.
Hycon Manufacturing Company
Ilex Optical Co.
Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Indiana Steel & Wire Co.
Indiana Steel Products Co.
Institute of Radio Engineers
International Resistance Co.
International Tel. & Tel. Corp.
Jacobsen Manufacturing Co.
James Knights Co., The
Kellogg Switchboard & Supply Co.
Kester Solder Company
Kleinschmidt Laboratories, Inc.
Lavoie Laboratories
Leich Sales Corporation
Lenkurt Electric Company, Inc.
Lewyt Corporation
Lenz Electric Manufacturing Co.
Loral Electronics Corporation
Machlett Laboratories, Inc.
Magnavox Company
Majestic Radio & Television, Inc.
Mallory & Co., Inc., P.R.
Martin, Glenn L., Company
Merit Transformer Corp.
Michigan Bell Telephone Company
Motorola, Inc.
Mountain States Tel. & Tel. Co.
Muter Company, The
National Company, Inc.
New England Tel. & Tel. Co.
New Jersey Bell Telephone Company
New York Telephone Company
Northwestern Bell Telephone Co.
Oak Manufacturing Co.
Ohio Bell Telephone Co.
O'Keefe & Merritt Company
Pacific Telephone & Telegraph Co.
Philco Corporation
Photographic Society of America
Pickering & Company, Inc.
Pioneer Electric & Research Co., The
Platt Electronics Corporation
Precision Apparatus Co., Inc.
Radiart Corporation
Radio Condenser Company
Radio Corporation of America
RCA Victor Division
Raymond Rosen Engineering Products, Inc.
Ray-O-Vac Company
Raytheon Manufacturing Company
Reeves Instrument Corp.
Remington Rand, Inc.
Saxonburg Potteries
Seeburg, J. B. Corporation
Sherron Electronics Co.
Shoup Engineering Company
Shure Brothers
Simmon Brothers, Inc.
Society of Motion Picture Engineers
Sonotone Corporation
Southern Bell Tel. & Tel. Co.
Southern New England Tel. Co.
Southwestern Bell Telephone Co.
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Sprague Electric Company
Stackpole Carbon Company
Standard Coil Products Co., Inc.
Standard Transformer Corp.
Stewart-Warner Corporation
Stupakoff Ceramic & Mfg. Co.
Sylvania Electric Products, Inc.
Telegraph Apparatus Co., Inc.
Telephone Services, Inc.
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Times Facsimile Corporation
Transmitter Equipment Mfg. Co.
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United States Rubber Company
United Telephone Co.
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Western Union Telegraph Co.
Westinghouse Electric Corp.
Weston Electrical Instrument Corp.
Willard Storage Battery Company
Wisconsin Telephone Company
Wollensak Optical Company
York-Hoover Corporation
Zenith Radio Corporation

The AFCA Convention does not mean only the male species this year as last provisions are made for the ladies - SO -

ASSOCIATION AFFAIRS

LaBrum Heads Philadelphia CofC

The AFCA in convening for its 6th annual national meeting at Philadelphia, April 24-26, will receive a warmly personal welcome from the president of the Chamber of Commerce of Greater Philadelphia, for one of the Association's own directors, J. Harry LaBrum, was just recently elected to that post.

The selection of "Hap" LaBrum, on Feb. 11, to head the Chamber of Commerce fulfills a prediction in the November 1950 issue of the magazine *Philadelphia*. A feature story on LaBrum in that issue (described in SIGNAL's issue of Nov-Dec 1950) forecast that whereas Col. LaBrum had refused offers of top posts in Philadelphia. "sooner or later he would be drafted by his almost endless number of friends for one or more top positions in the community."

"Hap" had served as general counsel for the chamber of commerce since 1949, and he is chairman of the board of governors of the Greater Philadelphia-South Jersey Council. In the AFCA he has been a strong participant in Association affairs since the organization's beginning.

(LaBrum is the second AFCA director elected to head a city chamber of commerce. See item on Joseph C. Wilson below.)

\- - -

Wilson City Group President

Joseph C. Wilson, another AFCA official who is a chamber of commerce president (see LaBrum above) was elected in mid-March as the first president of the newly organized Citizens' Committee for a Better Rochester (N. Y.). The new city group is sponsored by the Rochester Chamber of Commerce, which Wilson heads.

President of The Haloid Company. "Joe" Wilson was formerly president of the AFCA Rochester Chapter. In the national AFCA he is a vice president, director, and executive committee member.

\- - -

Watts Recovering From Illness

AFCA director and 1st vice president. W. Walter Watts, is recovering from a heavy siege of illness. He reports that he expects to be fully recovered and on hand for the convention. A former president of the Philadelphia Chapter, "Wally" is general chairman for this year's AFCA convention at Philadelphia.

See You in PHILADELPHIA

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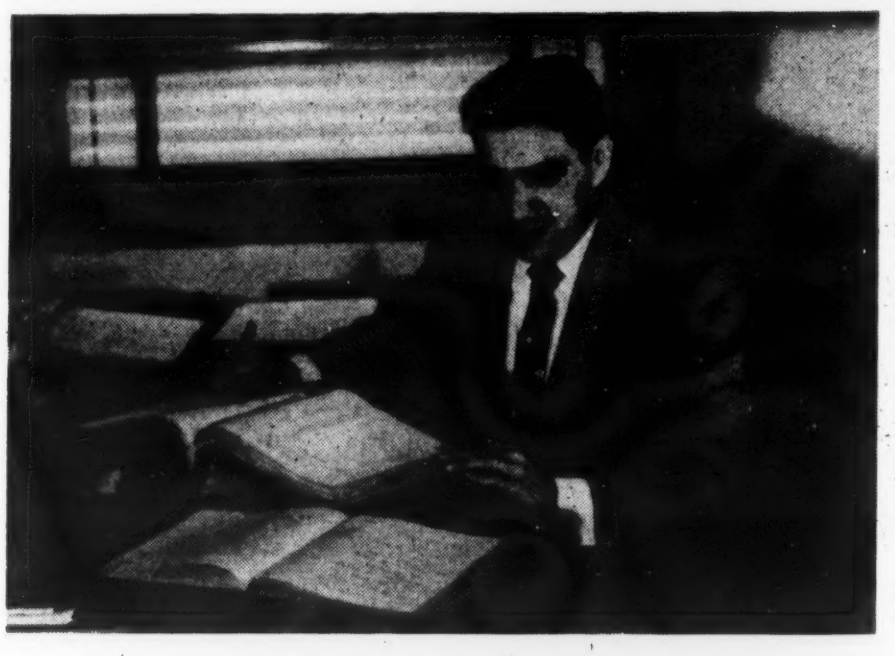

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FACSIMILE

In 1870 Henry Cook, of Paris, France, obtained U.S. Patent No. 98,927 for "Apparatus for the Transmission and Reception of Typographic or Autographic Telegrams." The first facsimile invention was in the year 1843. Since then a great many patents have been granted on machines for the transmitting of graphic forms by facsimile scanning.

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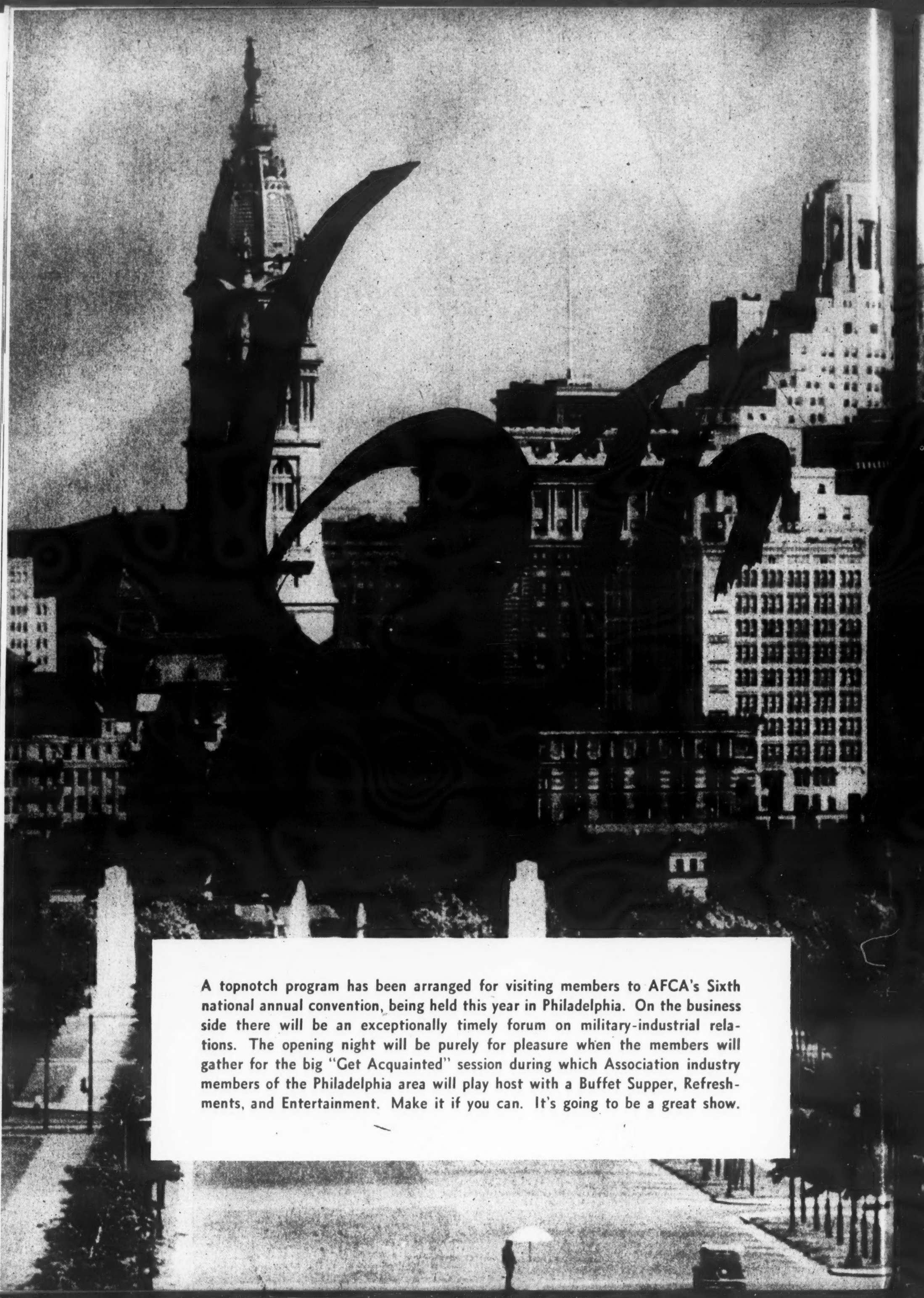

A topnotch program has been arranged for visiting members to AFCA's Sixth national annual convention, being held this year in Philadelphia. On the business side there will be an exceptionally timely forum on military-industrial relations. The opening night will be purely for pleasure when the members will gather for the big "Get Acquainted" session during which Association industry members of the Philadelphia area will play host with a Buffet Supper, Refreshments, and Entertainment. Make it if you can. It's going to be a great show.

PHILADELPHIA

April 24-25-26

CHAPTER NEWS

Chapter of the Year, 1951
SACRAMENTO
President—Paul W. Carrington
Past Pres.—Milton G. Mauer
Secretary—C. A. House

Atlanta

A firsthand report on Signal Corps activities in Korea by Maj. Gen. George I. Back, Chief Signal Officer, drew a record attendance of 200 members and guests at the winter dinner meeting of the chapter at the Fort McPherson officers' mess on January 19th.

Paying tribute to the communications industry at large, General Back said that only its wholehearted support in furnishing "enough and on time" made it possible for the Signal Corps to do "the magnificent job" in Korea of building an efficient communications system where none had previously existed. Proof of this, the general said, was contained in a letter addressed to him by General James A. Van Fleet, Eighth Army commander, "in which General Van Fleet said that no army in history had ever had better communications."

General Back also praised the Army Pictorial Service, whose combat photographers "for posterity, have recorded on hundreds of thousands of feet of film the daring, the glory and the heartbreaks of UN forces fighting in Korea."

Also featured on the program was an illustrated talk by Louis A. DeRosa, chief of the electronics warfare division, Federal Telecommunications Laboratories, who described the facilities and recent developments of the laboratories. He also showed movies of electronics equipment developed by the Federal Telecommunications Laboratories and explained the development and operation of navigation aids and "blind" landing systems.

Chapter President P. R. Curry of Western Electric presided and called for a rising tribute to the Atlanta General Depot contingent at the dinner. The depot was represented by 45 members, shepherded by the indomitable "Snuffy" Smith.

While in Atlanta, General Back, accompanied by Col. S. P. Collins, Third Army signal officer, visited the Signal Corps ROTC unit at the Georgia School of Technology, the signal supply section at the Atlanta General Depot, and Signal Corps units stationed at the depot for training. At each place General Back gave talks illustrated with interesting pictures of Signal Corps activities in Korea.

L. C. De Rosa, Federal Tel. & Radio Corp. representative, addressing Atlanta Chapter members.

Baltimore

The chapter's November meeting was held at Ft. George G. Meade and featured tours and inspection of the latest radio link mobile communication units in use at the installation. Actual equipment was in operation to be tried by members of the chapter. An added item of interest was a thirty-minute training film from the post library..

Special guest of the chapter was Brig. Gen. L. D. Carter, chief of staff, headquarters, Second Army. Following cocktails at the officers' club, dinner was served in the enlisted men's mess. Ninety-two members and guests were present.

Through arrangements made by E. K. Jett, vice president of the Baltimore Sun Papers and former president of the chapter, members of the Baltimore Chapter visited the new Sun Papers building on January 23rd. Highlight of the evening was a demonstration of the electronically controlled presses starting the first edition of the morning paper.

Maj. Gen. George I. Back, Chief Signal Officer, left, and Ralph Grist of Southern Bell T&T Co., at meeting of Atlanta Chapter.

The tour also included the photographic and engraving rooms, linotype rooms and special copy areas, together with mailing and handling facilities..

On February 7th and 8th, special demonstrations of some of the most recent communications equipment used by the Signal Corps were held at Fort Meade by arrangement with the Signal Corps Engineering Labs. The equipment included radio set AN/GRC-3 through 8 series (field sets); AN/PRC-6 handie talkie; AN/PRC-10 walkie talkie; switchboard SB-22—the highly portable switchboard taking the place of BD-71 and BD-72; the AN/PGC-1 combat portable teletypewriter; wire dispenser MX-306/A—high speed wire dispenser shot rom launchers and laid by aircraft, etc.

In addition to Baltimore Chapter members, the demonstrations were attended by numerous members of the Washington Chapter.

Chicago

"Telephones, Towers, and Television," a demonstration given by Dr. M. E. Strieby, director of technical demonstrations, American Telephone and Telegraph Company, was the feature of the chapter's January 24th meeting. Hosts to the chapter were the American Telephone and Telegraph Company and the Illinois Bell Telephone Company at their Chicago long distance headquarters building, 85 West Congress Street.

Following Dr. Strieby's demonstration, chapter members and guests were divided into small groups for a conducted tour of the building to see a number of new features which had been added since the chapter's last visit nearly two years ago. Highlight of the tour was an explanation of the microwave terminal equipment associated with one of the towers in the new transcontinental radio relay system.

Cleveland

Col. Mark Garr, USA (ret.), director of civil defense for the Cleveland area, spoke on "Civil Defense and Related Communications Problems" at the chapter's February 14th meeting. He outlined the requirements that communications must fulfill in the civil defense program for the metropolitan area of Cleveland, and described the operational activities with which the program is designed to cope.

The meeting was held in the Hunt Room of the Cleveland Engineering Society Building.

National Director of Chapters: W. W. Watts, RCA Victor Div., Camden, N. J.

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WASHINGTON: President—Percy G. Black, 906 Munsey Bldg., Washington, D. C. Secretary—W. P. Dutton, RCA Victor Div., 1625 K St. N.W., Washington, D. C.

STUDENT CHAPTERS

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OHIO STATE UNIVERSITY, Columbus, O. President—Raymond E. Spence, Jr.; Secretary—Robert Borden.

OKLAHOMA A & M COLLEGE, Stillwater, Okla.

PURDUE UNIVERSITY: Lafayette, Ind. President—Charles Terrell; Secretary—C. Harold Butler.

STATE COLLEGE OF WASHINGTON, Pullman, Wash.

TEXAS TECHNOLOGICAL COLLEGE, Lubbock, Texas. President—Arthur Seybold; Secretary Frank N. Foster.

UNIVERSITY OF ALABAMA: University, Ala.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

UNIVERSITY OF ILLINOIS: Urbana, Ill. President—Donald A. Jackson; Secretary—Milton F. Langer.

UTAH STATE AGRICULTURAL COLLEGE: Logan, Utah.

National Headquarters Chapters Secretary: Julia B. Godfrey

CHAPTER NEWS

Dayton-Wright

The second meeting since the chapter's reorganization was held on January 17th with 45 members and guests in attendance. Chapter President Paul Clark of RCA Victor Division explained the aims and purposes of the AFCA for the benefit of those not familiar with the association and urged present members to exert as much effort as possible to make the Dayton-Wright Chapter the top unit in 1952.

The featured talk of the evening, "The Impact of Electric Power on the Tactics and Techniques of Warfare," was ably presented by Col. Steve Gadler, electronics division, Air Materiel Command, Wright Field, who served as president of the European Chapter, AFCA, several years ago.

Plans are being made for a chapter periodical as soon as sufficient funds are available. A preliminary survey of advertising prospects for such a publication has already yielded several commitments.

At the conclusion of the meeting, some 15 new members enrolled in the chapter.

Future meetings of the Dayton-Wright Chapter will be held regularly on the fourth Thursday of each month at the Engineers Club in Dayton.

Decatur

The General Electric Company's plastics division plant was the scene of the Decatur Chapter's January 28th meeting.

The 43 members and guests met in the reception room of the plant where they heard an orientation talk and then were provided with glasses for use on the conducted tour. The molding and press operations of plastic items and the processes of manufacturing synthetic rubber proved to be of the greatest interest to the visitors.

The chapter is now making plans for a "ham" shack and photo lab for the use of its membership in order to stimulate interest in communications and photography as hobbies. Col. F. J. Schaal, commanding officer of the Decatur Signal Depot, is vitally interested in this project and has assured the chapter of any assistance necessary.

Detroit

The third of a series of lectures designed to keep members of the Greater Detroit Chapter up to date on atomic energy developments was presented at the February 28th meeting by Dr. Kenneth E. Corrigan of the staff of Harper Hospital. With "Application of Radioactive Substances to Medical Techniques" as his topic, Dr. Corrigan discussed some of the brighter aspects of the atomic energy research program.

CHAPTER NEWS

The chapter's annual election brought in the following new slate of officers: president — George H. Goldstone, attorney; 1st vice-president—Leo J. Ritter, New York Central Railroad; 2nd vice-president — Lee M. Augustus. Michigan Bell Tel. Co.; 3rd vice-president—L. E. Zumsteg, Western Union Telegraph Co.; secretary—John W. Ottinger, Michigan Bell Telephone Co.; asst. secretary—Fred A. DiPetto, Bendix Aviation Corp.; treasurer—W. C. Edwards, Michigan Bell Telephone Co.; asst. treasurer—John H. Schuler, Nash Kelvinator Corp.

The February 28th meeting was held in the Veterans Memorial Building and was open to the public. A number of chapter members met earlier for dinner at the Bit of Sweden Restaurant, Norton Hotel.

Far East

Over 200 Army, Navy and Air Force officers, enlisted personnel and civilians turned out for the meeting of the Tokyo post of the Far East Chapter on January 31st. This was the first meeting of the post since the Korean hostilities began and the first item of business was the election of officers to direct activities of the post during 1952.

Highlight of the meeting was a talk by Brig. Gen. Elton F. Hammond, signal officer, GHQ, FEC. General Hammond spoke on the benefits to be gained by cooperation with industry in the design and production of communications and photographic equipment. He also read a greeting from Maj. Gen George I. Back, Chief Signal Officer and former president of the Far East Chapter.

Following General Hammond's address were brief talks by Col. G. B. Hoffman, director of communications, FEAF; Capt. W. L. Caruthers, communications officer, NAVFE; Col. F. L. Moore, 1808th AACS; and Col. E. C. Greiner, ASAPAC.

The elections resulted in the following slate: chairman—Lt. Col. M. Heskett, comanding officer, 71st Sig Svc BN; 1st vice chairman—Col. G. B. Hoffman, FEAF; 2nd vice chairman—Lt. R. L. Scarborough, NAVFE; secretary—Lt. Col. R. M. Johnson, Sig Sec, GHQ, FEC; and treasurer—Capt. G. A. Barnes, FEAF.

Lt. Col. Heskett, the newly elected chairman of the Tokyo post, promised early action in the reactivation of the Far East Chapter. He stated that a meeting would be called within two weeks for the election of a board of governors who would make plans for a Tokyo convention of the chapter early in March.

Evidence of the success of the meeting and the interest it created in the association and its objectives was the fact that 61 enthusiastic new members joined the rolls before the meeting adjourned.

Dr. M. E. Strieby, director of technical demonstrations for AT&T, left, is greeted at Fort Monmouth Chapter meeting by Col. George P. Dixon, AFCA executive secretary. Maj. Gen. Kirke B. Lawton, commander of the post, looks on.

Fort Monmouth

Some three hundred members and guests attended the chapter's Jan. 31st meeting which featured Dr. M. E. Strieby of AT&T Co. and his lecture-demonstration on television and television networks. The speaker explained in popular terms how television works and how TV programs are carried from city to city. Using lantern slides and unique demonstration apparatus, Dr. Strieby covered this up-to-the-minute topic and explained coaxial cable and radio relay which make possible the inter-city video networks provided by the Bell System. He also described some of the interesting problems that challenged telephone people in the design of these networks which already permit millions to enjoy this new medium of news, entertainment, and education.

Dr. Strieby was introduced to the audience by Dr. J. O. Perrine, former asst. vice president of AT&T, who is now special consultant to The Signal School, Fort Monmouth.

Col. George P. Dixon, national AFCA executive secretary, reviewed the history of the association and reported on its current progress and activities. He discussed the various chapter set-ups throughout the country and pointed up the necessity for expansion and membership drives if a chapter is to maintain the interest and support of its members. He reported on the program planned for the annual convention in Philadelphia April 24-26 and urged maximum attendance from the chapter.

Atlanta Chapter meeting; Maj. Gen. George I. Back, CSO, right, with Maj. Gen. Beiderlinden, deputy commanding general, Third Army, and center, chapter past president Dan McKeever.

Gulf Coast

Harold G. Hirn, senior instructor of the microwave phase, electronics fundamentals department, 3380th TTG, Keesler AFB, was guest speaker at the chapter's January 4th meeting. He gave a most interesting and informative talk on the use of differential generators and control transformers in airborne radar equipment and the applications of synchros in general.

The chapter's regular monthly dinner-meeting was held at Stevens Restaurant, Biloxi, on January 14th with 56 members and guests present. Special guests of the chapter were George M. Applegate of Bell Telephone Laboratories, continental air defense group. Murray Hill, N. J.; and Capt. Garland Holt, headquarters, Air Training Command, Scott Air Force Base, Ill.

CHAPTER NEWS

Col. Edwin L. Wood, chapter vice-president, conducted the meeting in the absence of Col. John A. McDavid, chapter president. Curtis Hollister, chapter treasurer, read the minutes of the previous monthly meeting, plus those of the special technical meetings being conducted weekly by the chapter. A large number of new members were introduced and emphasis was placed on the current membership drive.

After the business meeting, the chapter was entertained by Marjorie Cavanaugh, singer, accompanied by Buddy Anthony, pianist. Dave Merrill (stage name for M/Sgt McKinley of Entertainment, Inc., Keesler AFB) gave a demonstration of mass hypnosis, using chapter members as "guinea pigs."

Two information films on the Korean activities featured the January 18th program. One film gave the latest information on the truce talks and the other showed the advances made by the UN forces and the atrocities perpetrated by the North Koreans and the Chinese Reds.

Photography was the subject of the January 26th meeting, with Major Reuben A. Krutz, assistant director of the airborne electronics operators department, Keesler AFB, as guest speaker.

Major Krutz discussed cameras and photographic accessories and techniques, using his own equipment which included three Leica cameras and a large variety of lenses. He also explained and demonstrated the techniques of stereo photography and micro photography as well as wide angle and close-up methods. An interesting question and answer period was conducted by Major Krutz at the conclusion of his talk.

Lexington City Mgr. Herbert D. Fritz, left, addressed recent Kentucky Chapter meeting. Looking over a piece of radar equipment with him are W. Stacy, Durward McKee, Capt. J. W. Pennybaker.

Dr. Delos Wickens of Ohio State University, Columbus, Ohio, spoke on the psychological aspects of retention at the chapter's February 1st meeting. He presented the results of the retention survey of the electronics fundamentals course conducted by the human resources and research committee at Keesler Air Force Base and the methods utilized in obtaining these results.

It was determined that students in the fundamentals course retained approximately 85% of the subject matter over a 56 day period. This figure is considerably higher than average, largely due to the fact that information presented during early portions of the course is continually used throughout the entire course. The retention figures covered a period of 56 academic days, the time during which the students were available at the base for testing. No conclusions were drawn as to retention over a greater period or the student's ability to "transfer" his training to the situation in the field.

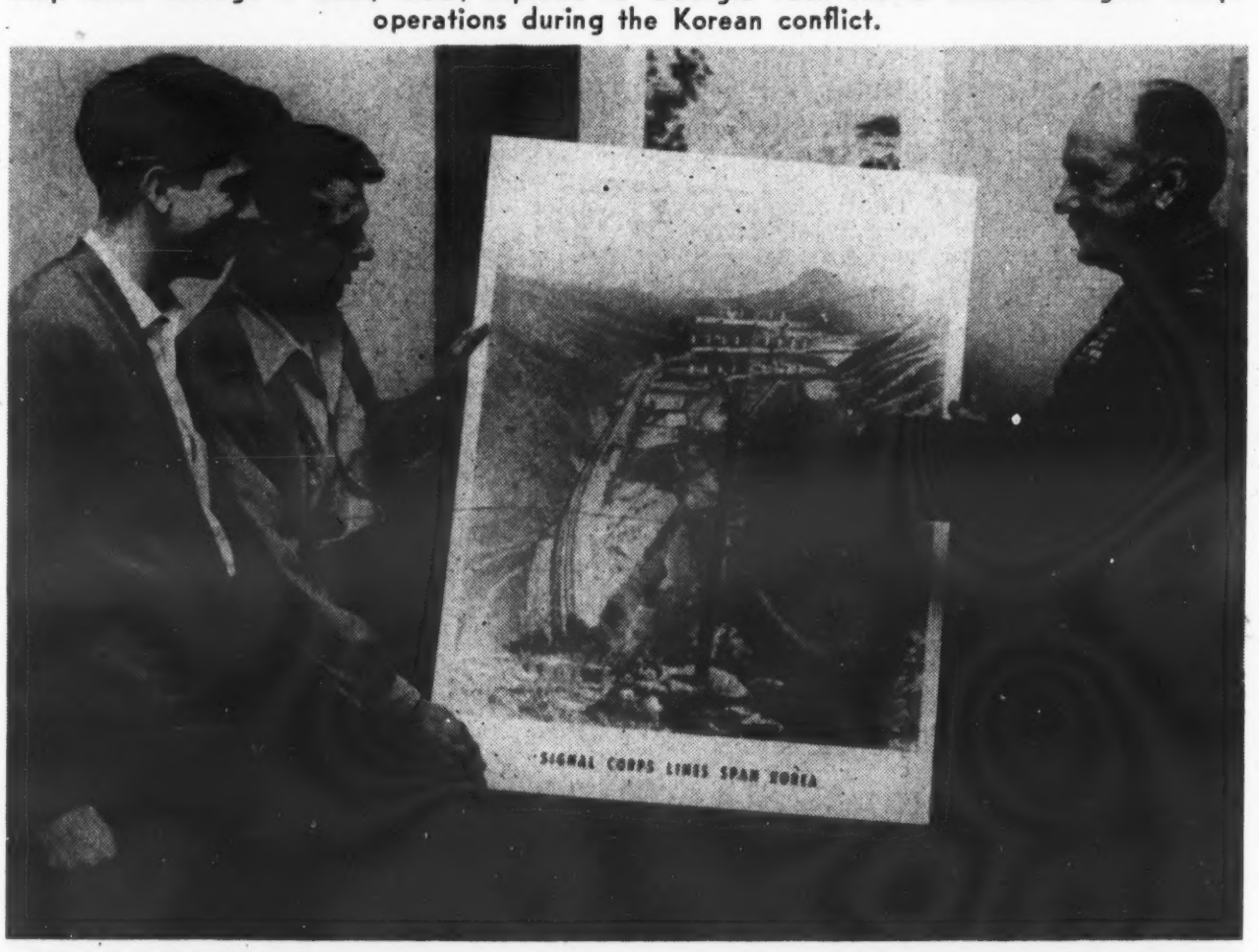
At the close of his talk, Dr. Wickens answered numerous questions on the testing techniques employed in the survey.

A demonstration of many varied applications of electronics was presented before the chapter on February 8th by S/Sgt. Paul F. Haughton, an instructor in the electronics fundamentals department. A tesla coil, burglar alarm, musical light beam, induction heating, Thomsen coil, standing waves of voltage and many other electrical phenomena were ably demonstrated by S/Sgt. Haughton and his assistants.

The show was a copy of one presented to all Air Force students entering electronics training at Keesler AFB. Interspersed with humorous incidents and audience participation, the whole show was well received by the chapter members and guests present.

Curtis W. Hollister, chapter treasurer, presided in the absence of other chapter officers away on official business.

Maj. Gen. George I. Back, CSO, explains to Georgia Tech ROTC students Signal Corps operations during the Korean conflict.



Kansas City

The official petition for a Kansas City Chapter charter was received at national headquarters on February 7th.

The chapter already has some 60 active members and its first regular meeting is scheduled for March 19th, at which time the chapter charter will be presented and permanent officers elected. Col. Carroll Miller, director of communications and electronics, Central Air Defense Force, will be the guest speaker at this meeting and will discuss communication requirements of the CADF.

Kentucky

Lt. Commander Dudley P. Towne, commanding officer of the local U.S. Naval Reserve unit, addressed the January 16th luncheon meeting of the chapter. Speaking on the development of communications and electronics in the Navy, Commander Towne commended the installation and perfection of the radio teletype machines aboard ships and said that 75% of the fleet now uses these machines which receive

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At New York Chapter meeting: L to R, Col. Charles Gordon, director of communications-electronics, Continental Air Command; Maj. Gen. George G. Finch, Hq, staff, CAC; Col. Ted L. Bartlett, chapter president; Maj. Gen. A. C. Kincaid, commanding general, CAC; Maj. Gen. Raymond C. Maude, communications director, USAF.

CHAPTER NEWS

messages essential to naval operations.

The speaker also discussed the integrated target designator, an electronic device designed to fix a ship's guns on a target, compute the speed at which the target is moving and where it will be by the time the ship's guns are fired. This, he said, is still not perfected but should greatly increase the accuracy of firing the ship's guns. Radar, look-outs, and sounding devices which operate under-water are standard methods of communications aboard every ship.

Col. Herbert L. Scofield, OCSigO, was guest speaker on January 23rd. Col. A. E. Mickelsen, OCSigO, was also a guest of the chapter and both officers were introduced to the members by Col. Harold T. Gallagher, president of the Kentucky Chapter and commanding officer of the Lexington Signal Depot.

With "Teamwork in the Supply System" as his topic, Col. Scofield said he thought the first consideration should be to know the objectives and goals of management so that each individual knows where we stand, what we are working toward, and how we can better perform our own jobs and individual accomplishments. Col. Scofield cited five points which are important in realizing the objectives and goals of management:

1. To produce goods or services which are of high quality.

2. To provide employment. He stated, "We can get the wrong opinion or the wrong approach when we think of this, as we are prone to think that more people employed, the nearer we can come to the accomplishment of our objectives. This is not necessarily so; we must also consider the economic standpoint in relation to employment."

3. To conserve health of employees and consumers of goods and services. He stressed the prevention of accidents while on the job and said we should make sure that the communication equipment sent to our fighting men is of high standard, capable of saving their lives in an emergency.

4. To avoid waste of natural resources. This, he pointed out, means the conservation of manpower, one of our most treasured natural resources, as well as oil, wood, coal, etc.

5. To aid in the national defense. This is a summation of the whole of "teamwork in the supply system," for that is the primary duty of all of us as Americans and we must keep that in our daily activities, thinking and operations.

The treatment which is necessary in combating polio was explained at the chapter's January 30th meeting by Robert A. Sparks, March of Dimes campaign director. On behalf of the depot, Mrs. Emma May Frank presented Mr. Sparks with a donation of $1,500.00 which had been collected in the March of Dimes campaigns at the depot.

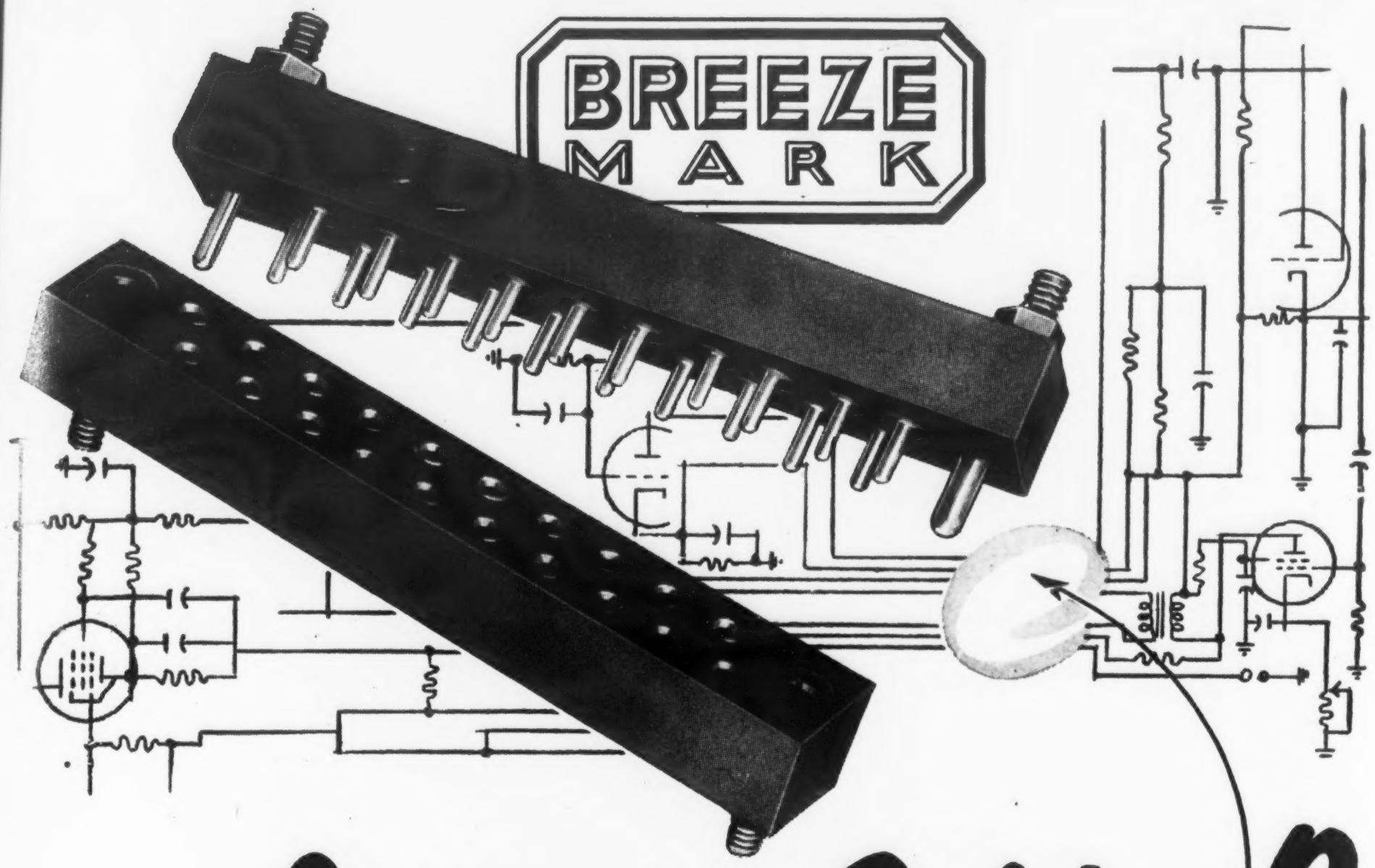
After the meeting, Mr. Sparks was taken on a conducted tour of the Lexington Signal Depot.

Dr. J. R. Schwendeman, head of the department of geography at the University of Kentucky, spoke on "The Geopolitics of the Present World" which he defined as "the foreign policy of a nation according to its needs." at the February 13th meeting. He said a nation is dead the minute it ceases to respond to challenges, and that a nation will not progress without some kind of stabilizing, anchoring influence. The United Nations, he believes, is an anchoring influence to the whole world. As observer at the UN conference at Lake Success, Dr. Schwendeman said he firmly believed it to be the most workable plan for world peace that has ever been suggested; however, miracles should not be expected of it as it will take a long time for the organization to work out problems as they come before it.

Glen McDaniel, RTMA president, who addressed recent New York Chapter meeting.

Lt. Col. Luther J. Ross presided at the February 20th meeting in the absence of the chapter president and introduced the guest speaker, Mr. Charles K. O'Connell, Secretary of State, who

New York Chapter meeting at Mitchell Air Force Base.



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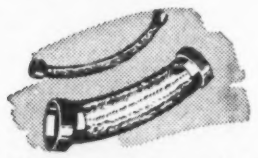

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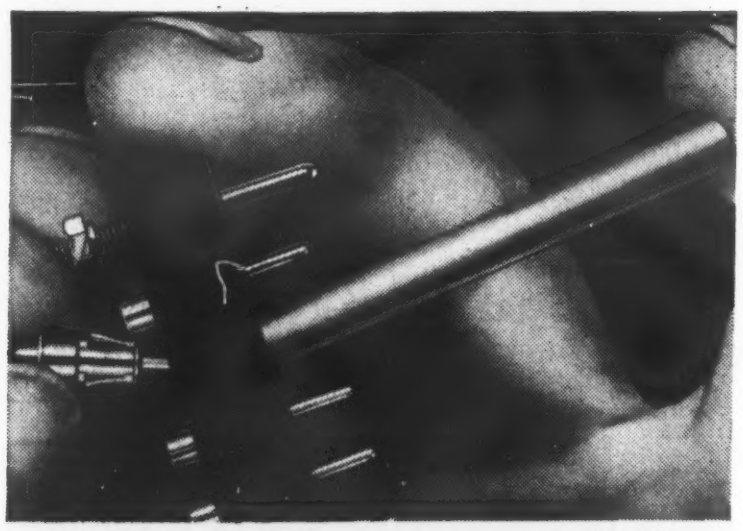

Removable pins **in Breeze connectors speed soldering, save time, trouble. Pins snap back into block.**

addressed the group on public relations.

Maj. Norman Miller, membership chairman, introduced the new members and welcomed the visitors.

The important question, "When will we have Television in Lexington?" was discussed at the chapter meeting on February 27th by J. E. Willis, general manager of Radio Station WLAP.

Mr. Willis explained that television itself is not really as new as most people believe and that it has been in the process of development for quite a long time. He said the exact answer to the question of when a satisfactory television picture will be available all the time "lies in the laps of the 'gods,' the gods being the Federal Communications Commission," whose responsibility is to administer the Communications Act as enacted by Congress in 1934. It is their job to handle allocations of radio, television, and other communications.

The speaker said, "The big question right now is to find sufficient room in the spectrum to take care of the services that are needed," and that the FCC has been working for four years on a new allocation plan for the entire country. Mr. Willis stated that Radio Station WLAP has already purchased a quantity of equipment and that no time would be lost when and if the FCC allocates spectrum space to Lexington. With good luck, Lexington may have first class television by late 1952 or early 1953, he said.

A number of guests from Washington were present and were introduced by Col. H. T. Gallagher, chapter president, as follows: Col. Harry L. Vitzthum, Lt. Col. A. T. Stanwix-Hay, Lt. Col. E. L. Tucker, Maj. A. J. Sebesta, and Mr. H. Goldwag.

John C. Longstreth, right, and Dr. M. E. Strieby of the AT&T Co. at joint meeting of Pittsburgh Chapter and the Western Pennsylvania Engineering Society, which was addressed by Dr. Strieby.

New York

Air Force night was observed by the chapter at its initial 1952 meeting on January 30th with Maj. Raymond C. Maude, director of communications, USAF, and Maj. Gen. George G. Finch, headquarters staff, Continental Air Command, the principal speakers. Maj. Gen. A. C. Kincaid, commanding general of the Continental Air Command, was also a guest of the chapter.

General Maude, in discussing the Air Force communications-electronics outlook, emphasized the importance of planning for future operations. Much of Air Force communications in Korea has been accomplished by World War II type equipment now being replaced by newer types. American industry is making possible, through developments, new electronic equipments, but much that is needed is not yet available.

The four main points in the Air Force's communications program for 1952 were outlined by General Maude as follows:

1. A global point-to-point communication network for use by the AACS and for improved Air Weather and Air-Sea Rescue communications. In addition, air-ground operations will be on radio-telephone throughout the world instead of radio telegraph.

2. Improved aircraft control and warning systems using the new radar screen.

3. Electronics counter-measures.

4. The conversion from VHF to UHF of aircraft and ground station radio equipment for air-ground communications. In this connection, General Maude brought out that fighter planes use VHF overseas but UHF is coming into use within the United States. There are many new problems to be solved, as, for example, pilot selection of frequencies, the number of present channels needed by polits and the necessity of changing channels quickly because of greater speed of jet planes.

General Finch described the long range program on which the Air Force has embarked for its reserve personnel. It is planned to establish a number of Air Force training centers convenient for reservists to attend in the evening and on weekends. In addition to these specialist training centers, 30 Air Force Reserve flight training centers will be made available with the regular Air Force complements for training purposes. General Finch emphasized the national security significance of technological supremacy.

The meeting was held at Mitchel Air Force Base, Hempstead, L. I., with Col. Charles Gordon, director of communications-electronics, Continental Air Command, acting as host to the chapter. Dinner was served at the officers' club and music was furnished by personnel of the post band.

Col. T. L. Bartlett of RCA, newly elected chapter president, presided and introduced the new chapter officers and committee chairman, as well as the following distinguished guests: Adm. Ellery W. Stone, president of All America Cable & Radio Corp. and immediate past president of the chapter; Vice Adm. W. S. Anderson, vice president of International Automatic Electric Co.; Herbert J. Schroll, asst. vice president, AT&T Co.; Maj. Gen. R. B. Colton, president of Federal Telecommunicatonsi Labs.; Maj. Gen H. C. Ingles, president of RCA Communications; Col. E. R. Shute, operating vice-president of Western Union Telegraph Co.; Brig. Gen. A. W. Marriner, director of aviation, IT&T Corp.; Rear Adm. Roy W. Graham, Raytheon Mfg. Co.; and Donald F. McClure, asst. vice president, New York Telephone Co.

President Bartlett made an announcement of the national AFCA convention to be held in Philadelphia April 24-26. It was agreed to hold the April meeting of the chapter at Philadelphia.

Glen McDaniel, president of the Radio-Television Manufacturers Association, was guest speaker at the chapter's February 27th gathering in the historic Seventh Regiment Armory.

Mr. McDaniel, who addressed the AFCA national convention in Chicago last year and who is a director of AFCA's Washington Chapter, gave an interesting and informative talk on the work the RTMA is doing towards the solution of manufacturers' problems under military procurement laws and practices. Highlighting his discussion was a review of procedures under which the participation of large and small

businesses in military contracts is determined. The subject of his off-the-record talk was "Spreading the Base of Military Procurement." Mr. McDaniel analyzed the harmful effects of excess profits taxes, government renegotiation policies, materials shortages, and inadequate financing of facilities for expansion of industry production on the spreading military procurement.

At the close of the meeting there were many expressions of appreciation for the constructive and useful contributions made by Mr. McDaniel in pursuance of the objectives of the AFCA.

Philadelphia

Col. Walter R. Godard, member of the staff and faculty of the Industrial War College, addressed the February 28th meeting of the chapter on the subject "Inside Russia." Colonel Godard is well known as an authority and speaker on this subject and his interesting and timely talk received a most enthusiastic response.

Col. Godard's talk was followed by an illustrated discussion and display of Russian communications equipment by Joseph C. Wilson of the Signal Corps Engineering Laboratories, Fort Monmouth, who had just returned from Korea.

One hundred forty-five members and guests attended the meeting in the Philadelphia Quartermaster Depot and the dinner which preceded it at the officers' club. Among those present were Admiral Leslie Kniskern, commanding officer, Philadelphia Naval Shipyard, and Mrs. Kniskern, who were guests of Capt. H. A. Ingram, USN, first vice-president of the chapter; and Col. W. Preston Corderman, commanding officer, Signal Corps Supply Agency, and a charter member of the association.

Chapter President Harry Ehle of International Resistance Co. announced the plans for the annual convention being held in Philadelphia April 24-26.

Pittsburgh

There are now facilities to connect six television networks to Pittsburgh stations if and when the present "freeze" is lifted by the FCC, said Dr. M. E. Strieby, public relations and technical demonstration director of the AT&T Company, before a joint meeting of AFCA's Pittsburgh Chapter and the Engineers' Society of Western Pennsylvania on January 11th.

Explaining the importance of the coaxial cable and the radio relay towers, operated by the Bell System, Dr. Strieby said Pittsburgh, with six incoming and three outgoing circuits over the Troy Hill relay station, was one of the few cities ready for immediate expansion of television service.

The speaker gave a demonstration of the difference in the uses of coaxial cable and relays, showing varied types of reflectors and other technical gadgets. He used small models of the 100 to 200-foot high steel relay towers to demonstrate the system by which telephone conversations or television programs can be carried across the country.

Dr. Strieby said the coaxial cable was never used to or from the west coast. This, chiefly because "it was too expensive at the time, then relays came along and they were used for easier transmission." He explained that even now as the towers are used, "leapfrog experiments" are under way and the coaxial cable may overtake the relay towers. And in a little time the towers may again overtake the cable. He said progress in engineering is just that fast. He said the cable is not a white elephant in the west because it provides telephone facilities but falls far short of meeting telephone demands. He said all over the country the company is far behind its needs for telephone facilities.

Tracing the development of TV from its invention by a German scientist in 1884 to the modern picture transmission over a network of more than 20,000 miles of coaxial cable and relay towers, Dr. Strieby stated that more than 7,500,000 messages per second are transmitted to produce the picture on a home television screen. He added that the Bell System plans to expand into the Southwest this year, linking Tulsa, Houston and Dallas into the cross-country system. Service to Miami, Fla., is also expected to start soon.

Brig. Gen. Brooke E. Allen, head of the Air Pictorial Service, and John Whittle of Eastman Kodak, Rochester Chapter president, at recent meeting of chapter.

The meeting was held at the William Penn Hotel and drew an attendance of 325 persons. A pre-meeting dinner honoring Dr. Strieby was given at the Harvard-Yale-Princeton Club and was attended by representatives of the various communications industries in the area.

Rochester

The importance of photography in Air Force operations was emphasized by Brig. Gen. Brooke E. Allen, head of the newly organized Air Pictorial Service Command, at a luncheon meeting of the Rochester Chapter on February 14th at the Chamber of Commerce.

"Combat pictures, which may influence battle techniques, documentary historical and training films, together with use of television in training, come under our direction," he said, "and are vitally important to Air Force operations."

General Allen pointed out that unification of the services had placed responsibility for its pictures directly on the Air Force, and Korea had found this service unprepared. Since he took over the problem, he said, picture squadrons had to be trained and activated while the Command was at the same time preparing an overall, permanent program to meet photographic requirements. "We have tried to do it economically," he said, "and we shall need a lot of technical help from industries."

The chapter's annual election was held with the following results: president—John Whittle, Eastman Kodak Co.; vice-presidents—Edward Springer, Wollensak Optical Co.; George Lawrence, Eastman Kodak; Howard Schumacher, Graflex, Inc.; secretary—Robert Bowie, Eastman Kodak, re-elected for a second term; treasurer—Rufus Rosenbloom, Ilex Optical Co.

Chapter President Joseph C. Wilson of Haloid presided at the meeting. At the speakers' table also were Commander Glenn E. Mishler, assigned to Kodak Navy Ordnance; Gen. Edward Peck Curtis and John Whittle of Eastman Kodak; and Col. Harry Haas of Army Ordnance in Rochester.

Sacramento

The chapter's January 29th meeting took place at Mather Air Force Base, with Colonel John W. White, commanding officer, as host to the members and guests.

First on the program were two movies showing hte latest advancements in jet planes and communications—one depicted a mock radar bombing in Sacra-

mento and the Bay Bridge. The second phase of the program was a conducted tour of the base with those in attendance divided into groups of fives. The many and varied types of communications in operation at the base were demonstrated and explained. Of special interest were the A6 bomb trainer and the Q13 supersonic radar trainer.

A social hour and dinner were held at the officers' mess prior to the tour.

National Executive Secretary George P. Dixon, who had made a trip to the west coast to visit the four AFCA chapters there, was guest of honor at the Sacramento Chapter's dinner meeting on February 20th. Col. F. T. Gillespie, commanding officer of the Sacramento Signal Depot, where the meeting took place, was host for the evening.

Colonel Dixon gave what the chapter reported as an "inspirational" talk on the history and background of the association, stressing its objectives in light of present-day needs and reviewing its national activities and those of its chapters throughout the country.

A cocktail hour was held in the officers' mess prior to the dinner in the post restaurant. Chapter President Paul Carrington presided and acted as toastmaster for the evening, introducing Col. Dixon and Maj. Arthur A. Crawford of the Southern California Chapter who had accompanied him to the meeting.

Lt. Col. Leo Tamamian, program chairman, and his hard working committee were credited with the outstanding success of the meeting which was attended by 281 members and guests.

The day following the meeting, Col. Dixon and Maj. Crawford were taken on a tour of the Sacramento Signal Depot by Col. Gillespie and Lt. Col. Tamamian. Both of the visitors agreed that the depot was one of the finest installations they had ever visited.

Sacramento Chapter meeting: L to R, Col. F. T. Gillespie, commanding officer, Sacramento Signal Depot; Col. George P. Dixon, AFCA executive secretary; chapter president Paul Carrington; C. A. House, chapter secretary.

San Francisco

The chapter featured a tour of station KRON-TV on January 17th. Meeting first at the Colonial Restaurant in Colma for a social hour and dinner, the 62 members and guests were briefed on the tour by R. A. Isberg, chief engineer of the station.

KRON-TV is located at the top of San Bruno Mountain where it occupies a building jointly with KNBC-FM. This site gives excellent coverage for most of the bay area. A 200 foot tower holds the super giant antenna which has an effective radiated power of 14.5 KW. Mr. Isberg told how good engineering made it possible to operate the station with a minimum staff. Most of the live telecasts are made from studios in downtown San Francisco but the station is equipped with a small studio where programs can be originated at times when the other studios are closed. A mobile station is also available for coverage of interesting events and had been used the night before for covering the arrival of the passengers from the snowbound train "City of San Francisco" at the Oakland Mole.

After being warned of the hazards of the road leading to KRON-TV, the members proceeded on to the station where, in groups of about twenty, they were taken on conducted tours. The operation of the station and its equipment proved very interesting and was thoroughly enjoyed by the chapter.

During the dinner-meeting, Chapter President Harry Austin announced the results of the recent election of members to the board of directors and for the information of those present read the names of the newly elected members as well as those still in office for an additional year. They are: class of 1952—Harry E. Austin, RCA Communications; Maj. Thomas H. Dooling, Exide Battery; Col. Lloyd C. Parsons, signal officer, Sixth Army; Col. H. L. Schnoor. Pacific Tel & Tel Co.; Comdr. Sydney N. Barton, Mackay Radio; Russell H. Cobb, Western Union; R. J. Loveland, California Water & Telephone Co.; William R. Patton, Lenkurt Electric Co., Inc.; C. L. Wickstrom, Pacific Tel & Tel Co.

Visiting the San Francisco Chapter on February 21st, Col. George Dixon, AFCA National Executive Secretary, traced the history of the association from the early days of its first predecessor organization, the United States Veteran Signal Corps Association formed after the Civil War. He told of the growth of the association and stressed the need for more group members to help carry out the objectives of the association. He reported on the new chapters being formed and described the activities of other chapters throughout the country.

Results of the recent election of officers were announced as follows: president—Col. Lloyd C. Parsons, signal officer, Sixth Army; 1st vice-president—C. L. Wickstrom, Pacific Tel & Tel Co.; 2nd vice-president—William R. Patton, Lenkurt Electric Co.; treasurer—Russell H. Cobb, Western Union; secretary—Lt. Col. William G. Damerow, Pacific Gas & Electric Co., reelected for another term. Committee chairmen: executive—Col. Henry L. Schnoor, Pacific

At Scott-St. Louis Chapter meeting: L to R, Harold Wise, Illinois State Police radio, and chairman, IRE, St. Louis; Sgt. P. Wellborn, MARS; Capt. Paul McCallen; (next unidentified); J. Barnes of Motorola; D. Smith of Sylvania Electric Co.; Sgt. N. Freeman.

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CHAPTER NEWS

Tel & Tel Co.; membership—Harry E. Austin, RCA Communications, immediate past president of the chapter; planning—Lt. Col. Claude E. Taylor, hqs. Sixth Army; program—Maj. Thomas D. Razovich, station KFRC; entertainment—Horace E. Corey, Pacific Tel & Tel Co.; publicity—Col. S. R. Irwin, Oakland Tribune.

The meeting took place at the Colonial Restaurant, Colma, with the newly elected 1st vice president, C. L. Wickstrom, presiding in the absence of Col. Parsons, chapter president, who was away on official business. Among the members and guests present were a number of old friends of Col. Dixon: H. W. Glensor, a San Francisco attorney who began his communications experience as a telegraph operator in the Spanish American War; and Tom Dooling, a director of the San Francisco Chapter and former president of the Boston Chapter of the old American Signal Association. Col. Dixon and Tom Dooling had served together during the "Border Incident" and had not seen each other for over thirty years although they had kept in touch by mail. Col. Hobart R. Yeager, USAF, and Capt. Donald E. McKay, USGC, both formerly active in the New York Chapter, were also present.

Left: Officers of Scott-St. Louis Chapter with charter and charter membership plaque. L to R, A. Eisenmayer, M. Ebinger, Col. W. N. Snouffer, Lt. Col. R. Conrad, M/Sgt. J. Blessing.

Above, L to R; Capt. P. McCallen; M. Ebinger, 1st v.p., Scott-St. Louis Chapter; A. R. Richards; E. Brockman; and S/Sgt. J. Moon.

Scott-St. Louis

Officers to replace those having served temporarily in the new chapter were elected at a meeting on January 18th. The new slate is:president—Col. William N. Snouffer, director of communications and electronics div. of hqs., Air Training Command, Scott AFB; 1st vice-president — Richard A. Ebinger, owner of Ebinger Radio and Supply Co., St. Louis; 2nd vice-president—Lt. Col. Richard D. Conrad, operations officer, 3310th TTG, Scott AFB; secretary—Allan L. Eisenmayer, training specialist, dept of radio mechanics, Scott AFB; treasurer—M/Sgt. Joseph F. Blessing, operations chief of radio mechanic, ground equipment branch, Scott AFB. Retiring officers were: Lt. Col. George S. Walborn, formerly of Scott AFB, president; Col. G. E. Popkess, 1st vice-president; Howard D. Yund, Scott AFB, 2nd vice-president; and Capt. Robert L. Oase, Scott AFB, secretary. Allan Eisenmayer, the newly elected secretary, had served as treasurer pro tem.

The program feature was an illustrated lecture by Jack Barnes, radio communication engineer of Motorola, Inc., and a member of the chapter, on the subject of VHF mobile communications equipment and advanced developments for obtaining narrow bandwidths and intelligibility in transmissions by FM at these frequencies. He also demonstrated some of the units developed by his company using sub-miniature tubes.

The meeting was held at the Elk's Club in Belleville, Ill., and was attended by 150 members and guests.

Arthur R. Richards, principal instructor, department of advanced courses, Scott AFB, presented a fascinating lecture on "Uranium Prospecting in Illinois" at the chapter's February 8th meeting. He explained the basic theory of the Geiger tube and methods to use in detecting and analyzing ores. He used the visual-cast projection device to present various circuits for Geiger counters, discussing advantages and disadvantages. Samples of uranium ore accumulated in his explorations of the Illinois and Missouri areas were exhibited and samples passed out to members of the audience.

A particularly interesting highlight

Seattle Chapter meeting attended by AFCA Executive Secretary George P. Dixon on his tour of West Coast chapters.

of the talk was a series of tape recordings of actual soundings taken from various sources of radio-active materials. A humorous note was added in the form of a tape recording illustrating the false soundings of Geiger counters and electronic devices as depicted on radio and television dramas.

The following members were elected to serve on the chapter's board of directors: Jack A. Barnes, Louis E. Dechant, Capt. Robert L. Oase, M/Sgt. John L. Porter, George G. Roberts, Richard E. Steward, Sgt. Paul R. Wellborn, Harold G. Wise and Howard D. Yund.

Committees were appointed by Col. W. D. Snouffer, chapter president, as follows: Membership—Mike Ebinger, chairman; Harold G. Wise and Allan L. Eisenmayer, members. Meetings and programs—Lt. Col. Richard D. Conrad, chairman; members to be appointed later. Publicity—Howard D. Yund, chairman; Phillip Bloom, Harold Riebe and Henry Strackeljahn, members.

Seattle

"The Navy VLF Transmitter Station at Arlington (Jim Creek), Washington" was the program subject of the January 16th chapter meeting. After a few introductory remarks by Cmdr. Lester M. Hill, commanding officer, U. S. Naval Communications Station, 13th Naval District, Seattle, the program was turned over to Lt. Cmdr. R. J. Shea who gave a very interesting talk on the project and the problems encountered in building a high-powered station of this type.

The "Jim Creek" installation is expected to provide very reliable communication over a wide area with full power of one million watts. The antenna will have an overall length of two miles and will be hung between two mountain tops, being 3000 feet from the ground at the center. Lt. Cmdr. Shea noted that one of the many problems to be encountered in the erection of the antenna was the requirement that no nick greater than one-sixteenth inch in depth be allowed in any conductor of the antenna.

The ground system for the station requires the laying of 275 miles of wire in the ground. A total of 3000 KW of power will be required for the station with the transmitter requiring 2000 KW. Auxiliary power plants consisting of two 600 KW units for filament supply and three 1000 KW units for plate supply and other requirements will be provided.

The chapter's annual elections were held with the following result: president—Frank D. Keyser; 1st vice-president—Warren J. Taylor; 2nd vice-president—Capt. R. K. Johnson; secretary—Merrill R. Stiles, re-elected for another term; treasurer—Joe E. Gregory, also re-elected for a second term. The trustees are: James M. Campbell, Marshall B. James, Col. Fred P. Andrews, Lt. Col. Clarence D. Lawrence and Phil Duryee.

Seattle Chapter meeting. Head table, L to R, Capt. F. K. Johnson, Maj. Gen. F. Stoner, F. D. Keyser, G. P. Dixon, Col. F. Andrews, Cmdr. L. Hill.

The meeting was turned over to the new president, Frank Keyser, by the retiring president, Marshall James. President Keyser announced that the National Executive Secretary, Col. George P. Dixon, would visit the chapter at its February meeting and suggested that further discussion of the "Jim Creek" project at that time would no doubt be of interest to Col. Dixon.

Guest of honor at the February 19th dinner meeting, Colonel Dixon was introduced to the members and guests by Maj. Gen. Frank E. Stoner. Opening with the background and history of the association, Col. Dixon went on to report on the excellent progress made by the AFCA during the past year with sizable increase in group and individual memberships resulting from the increased activities of the chapters. In discussing items important to the success of a chapter, the Executive Secretary emphasized the need for active officers—specifically, the president, secretary, and membership chairman. He also noted that efforts should be made to secure greater participation of group members in chapter affairs.

At the conclusion of Col. Dixon's talk, which was entertaining as well as instructive, Chapter President Frank Keyser expressed the appreciation of the chapter for his visit.

A short resume of the "Jim Creek" radio station project, described at the January meeting, was given for the benefit of Col. Dixon and other guests by Cmdr. L. M. Hill and Lt. Cmdr. R. J. Shea of Naval Communications.

The dinner meeting was held in the Chamber of Commerce Building, Seattle, with 81 members and guests present.

During his short stay in Seattle, Col. Dixon had an opportunity to renew many old friendships. Visits t oportions of the ACS and to present and prospective AFCA group members occupied most of the day.

South Carolina

"A Century of Progress in Telegraphic Communications" was the subject of a talk by J. H. Evans, superintendent of Western Union Telegraph Co. in Atlanta, at the February 6th meeting of the South Carolina Chapter. With the aid of pictures and charts, Mr. Evans traced the progress of the telegraph company from the completion of the first trans-continental one-wire system to the modern carrier and radio relay network today.

Ralph Grist, AFCA southeastern area representative, re-stated the aims and purposes of the association for the benefit of guests present and pointed out the need of more members from the armed forces, radio, photography and other communications interests in order to help carry out the objectives of the AFCA.

The results of the recent annual election were announced by W. R. Carter, chairman of the nominating committee, and the new officers for the coming year were introduced by Chapter President John L. H. Young as follows: president—Capt. Henry H. McCarley, USN, Charleston Naval Base; 1st vice-president—Charles M. Bell, Chester Telephone Co.; 2nd vice-president—Fritz M. Kreutzer, Naval Training Center; secretary-treasurer—Carl E. Newman, Southern Bell Tel & Tel Co., re-elected for another term.

At the same time Col. Young announced his recall to active duty by the Army and expressed his regret at leaving the chapter. He urged the cooperation of all members in building up the chapter and secured Capt. McCarley's permission to appoint W. R. Carter chairman of the membership committee.

Fifty-one persons attended the meeting at the Columbia Hotel in Columbia and the cocktail hour and dinner which preceded it. Arrangements for the very successful evening were made by Chapter Secretary Carl Newman with the able assistance of Roy Mayfield and W. R. Carter.

Southern California

AFCA's national executive secretary, George P. Dixon, during his visit in February to AFCA chapters on the West Coast spent considerable time in and around the Southern California area calling on various members of the chapter and officials of electronic industries in and around Los Angeles.

On Wednesday, February 13th, the

officers of the chapter met at luncheon with Col. Dixon and discussed at some length the problems pertaining to their particular chapter. Those present were: president—Arthur C. Hohmann, deputy chief of police, Los Angeles; vice-presidents—Col. Loyd C. Sigmon, vice-president and general manager, station KMPC; Col. Kenneth B. Lambert, Metro-Goldwyn-Mayer; secretary-treasurer—Richard F. Walz; and Maj. Arthur A. Crawford of Crawford's, Inc., chairman of the membership committee.

The following evening, February 14th, a general meeting of the chapter was held at the Carolina Pines Restaurant in Los Angeles. The meeting was not particularly well attended but those members who did come had done so because they were interested in the AFCA and were anxious to see what could be done to resume the local activities of the association. There was much discussion concerning the difficulties of getting out a good crowd to chapter meetings in Los Angeles due, chiefly, to the great distances involved. The Southern California Chapter is spread over many square miles and, in most cases, it is necessary for members to drive from forty-five minutes to an hour to get to a meeting.

The final consensus was that it might be feasible to form several sub-chapters at such points as Pasadena, Hollywood, Culver City, Long Beach, Riverside, San Bernardino, etc. The president or chairman of each such sub-chapter could serve as a vice-president of the parent Southern California Chapter and the sub-chapters would hold monthly luncheon or dinner meetings as deemed best. The parent chapter could then hold a meeting in Los Angeles each quarter or at some other regular interval to which the members of all the sub-chapters might come. These overall meetings would be planned on a scale such as the one recently held with Col. George W. Goddard as guest speaker, or such as Col. H. H. Dillard is planning for the near future. The latter is a Signal Corps show called "From the Trenches to the Pentagon" and is acted out with actual personnel and equipment at nighttime under lights and is said to be a most dramatic spectacle.

No officers were elected at the meeting but Major Crawford was appointed chairman of a nominating committee which is to report at the next meeting when a new slate of officers will be elected.

F. E. Warren-Cheyenne

The chapter held a bingo party on February 4th to raise money to send a delegate to the national convention in Philadelphia.

John Albright, Rocky Mountain States Telephone Company, was guest speaker at the regular monthly meeting in February and discussed the company's new micro-wave radio relay system.

Brig. Gen. James C. O'Connell, Deputy Chief Signal Officer, addressing meeting of Washington Chapter commemorating Signal Corps 89th anniversary. Meeting also featured display of new Signal Corps equipment, and Telecon exchange of greetings with Eighth Army.

Washington

The March meetings of the Washington Chapter, which observe the Signal Corps' anniversary of its founding, traditionally bring a high point in attendance for the chapter's season. This year's March meeting, held on the 5th at the usual National Press Club auditorium, not only upheld the tradition, but packed in the AFCA members and guests a little tighter than ever before.

Over 300 attended the luncheon meeting to help commemorate the 89th birthday of the Signal Corps, to hear an address by the Deputy Chief Signal Officer, Brig. Gen. James D. O'Connell, and to see a display of Signal Corps equipment, which included a demonstration of Telecon (teletypewriter conference) in an exchange of greetings with the Eighth Army in Korea.

The display of equipment and the personnel present with the exhibit, Gen. O'Connell pointed out in his address, were not part of a special and expensive stunt, but belonged to the Signal Corps new equipment introduction teams, regular groups who have been visiting virtually all Army schools and major units both in the U.S. and overseas. In this operation, stated Gen. O'Connell, the men of the teams have replaced highly paid laboratory engineers who at one time were necessarily diverted from development for these training purposes.

Highlight of the equipment display was an experimental model of a miniaturized radio-teletypewriter converter using transistors, obtained from the Bell Labs, in place of vacuum tubes. This device was used, alongside conventional equipment, in the Telecon demonstration for the AFCA members in the exchange of messages with the Far East Command. The converter, a product of the Signal Corps Engineering Labs, weighs only 10 pounds with power supply, and will do the work of about 100 pounds of comparable equipment now in service. It takes only one and one-half watts of power, supplied by dry cell batteries, compared with the 175 watts from heavy generators required in present equipment.

In the Telecon demonstration before the meeting, a message from the Chief Signal Officer, Maj. Gen. George I. Back, was sent to Brig. Gen. Wesley T. Guest, signal officer of the Eighth Army, conveying greetings to Gen. Van Fleet and the Eighth Army and its Signal Corps personnel. In a return message from Korea, Gen. Guest sent a greeting from Gen. Van Fleet who conveyed "his best wishes to the Corps on the occasion of its anniversary," and expressed "his appreciation for the unfailing and superior communications and photographic support which have contributed so greatly to Eighth Army success."

In his opening remarks, after expressing the regrets of Gen. Back, who was in Walter Reed Hospital recovering from a minor operation, that he could not attend the meeting, Gen. O'Connell gave a brief outline of the beginnings of the Signal Corps, pointing up the unusual character of its first chief, Albert Myer, whose "inventiveness and energy resulted in one major improvement after another." He began, stated the deputy CSO, "a tradition of progress, a stirring challenge to each new generation of signalmen to insure that the advances of science and industry be made rapidly available in communications and electronics to serve the needs of the Army."

The Feb. 6 meeting of the Washington Chapter, which also packed the National Press Club auditorium, with over 300 in attendance, featured an address by Rear Adm. Joseph R. Redman (USN, ret.), World War II Director of Naval Communications, and now vice president in charge of communications of the Western Union Telegraph Co. Adm. Redman described for the AFCA audience his company's high-speed facsimile system, particularly its application by the Air Force. The highlights of his talk are given, in some detail, in SIGNAL's news section, this issue.

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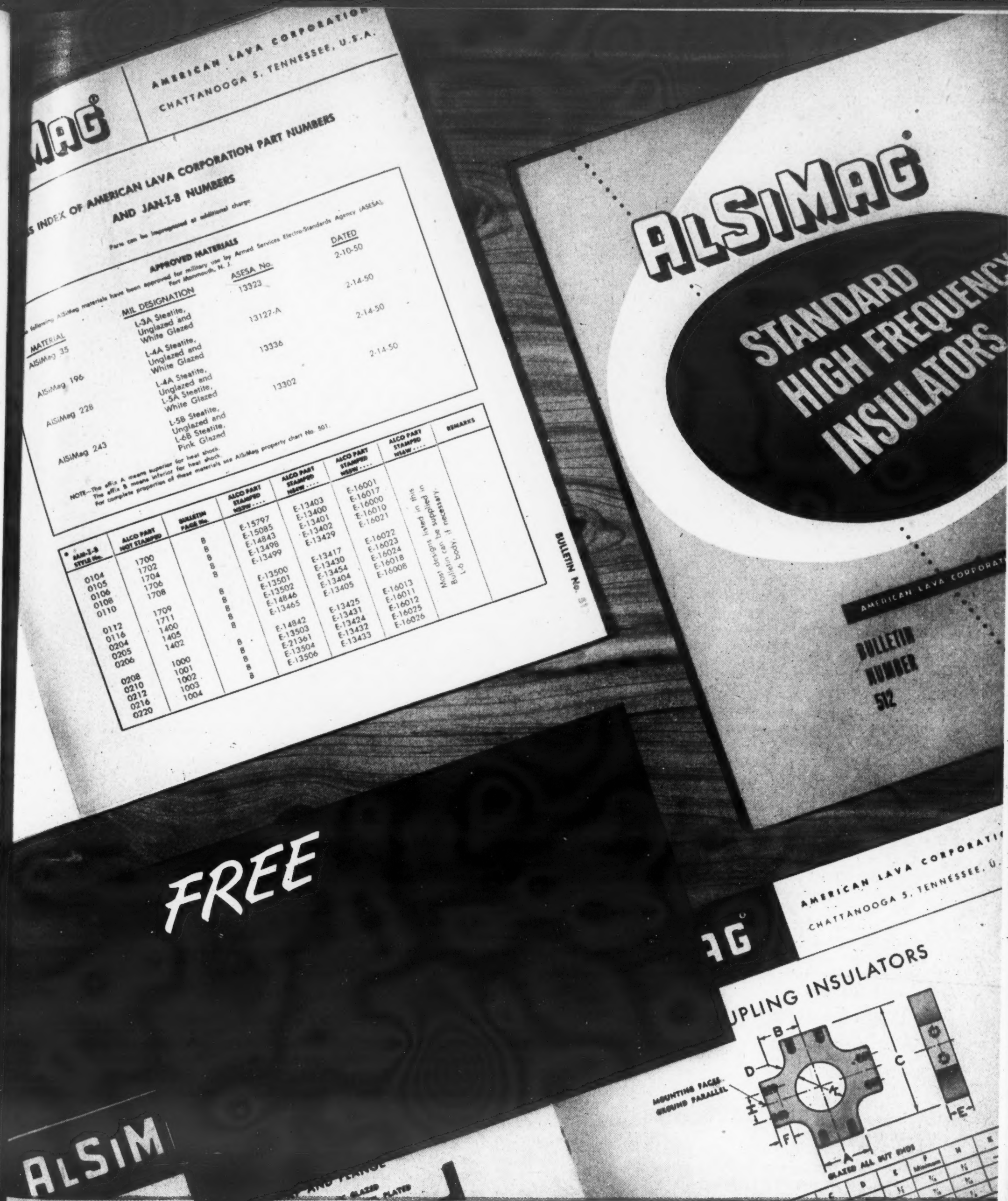

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SIGNAL NEWS

Communications-Electronics-Photography

Strong Senate Approval for Walker Appointment As FCC Chairman And Bartley As Commissioner

The recent appointmente of Paul A. Walker as chairman, and Robert T. Bartley as commissioner of the Federal Communications Commission, have brought out considerable expression of assurance for the continuation of the FCC's successful meeting of some of the most pressing problems in its 18-year history. Appointed Feb. 28 to the chairmanship, Mr. Walker had been vice chairman and had been a commissioner of the communications agency since its start. Mr. Bartley was administrative assistant to Speaker of the House Rayburn and had been FCC telegraph division director from 1934 to 1937.

The decision for the successor to former Chairman Wayne Coy, who resigned Feb. 21 to take a $25,000-a-year television consultant post with Time, Inc., came quickly from President Truman. Even though the White House did not announce the selections of Chairman Walker and Mr. Bartley until Feb. 28, it is known that the Chief Executive informed both of them two days earlier of his choices.

That the selections of Chairman Walker and Commissioner Bartley will give renewed and even greater strength to tht FCC seemed to be the consensus of the members of the Senate committee at the hearing on Mr. Bartley, which lasted a little more than an hour. It was attended by an unprecedentedly large number of committee members, a total of 11 of the 13 members.

As evidenced by the fact that the entire questioning by the Senate committee members was centered on the lifting of the television "freeze" at the earliest possible time and other television issues, Commissioner Bartley will naturally have to center his attention on the television allocation and "freeze" lifting, but it is known that he has retained a definite interest in the telephone, telegraph, and international communications questions in the FCC's functions. There appeared to be every likelihood that Mr. Bartley will replace former Chairman Coy on the FCC's telephone and telegraph committees.

Chairman Walker, with his service on the FCC having spanned the entire existence of that agency, has the widest acquaintanceship with the Commission staff, and is known to have their entire support. One of his closest staff associates is also a veteran of the FCC from its beginning — chief accountant William J. Norfleet, who has a record of the highest integrity and conscientious performance of duty during his lengthy government service.

In his new position as television consultant for Time, Inc., which becomes effective April 1, former Chairman Coy will be free to enter other activities, and it is known that Mr. Coy has long wished to re-enter the newspaper field in his home state of Indiana. Time, Inc., which controls the magazines, *Time*, *Life*, and *Fortune*, is understood to be considering entry into the television broadcasting field.

Shortly after Mr. Coy's resignation, the FCC unanimously adopted a letter to its former chairman, presented by the then acting chairman, Mr. Walker. The letter stated that Mr. Coy's resignation brings to an end a career of service "marked by the highest conception of duty, by tireless industry, and by conspicuous leadership."

Theater-TV Hearing Postponed

May 5 Now

Because of the growing apparent length and complexity of the scheduled theater television hearing the FCC has again postponed the starting date of the theater TV sessions, setting the time now for May 5. The order postponing the hearing, released Feb. 26, pointed out that the action was required by the engagement of the FCC in other matters.

The Commission had earlier given notice that parties to the theater television hearings have proposed the use of frequencies between 5675 and 7125 megacycles presently allocated to a number of common carrier and safety and special radio services.

Already approximately 100 witnesses are slated to take part in the proceeding, the bulk of which will be representing the theater groups. In addition it is expected that a number of private licensees or large representative associations of radio users in the involved frequency band will shortly give notice of their intended appearances, so that they may testify before the full Commission on their present utilization of and future plans for frequencies in this area.

The American Petroleum Institute, in a Feb. 15 filing with the FCC, became the first of the large industry groups representing operators in the land mobile radio services to contest any possible encroachment on the industry's allocated frequency bands during the FCC's theater television hearing.

In the statement and notice of appearance in the hearing, dealing with the allocation of frequencies and promulgation of rules and regulations for the theater TV service filed on behalf of the central committee on radio facilities of the API by Washington attorney Joseph E. Keller, the Institute said that the petroleum industry is "not opposing a theater television service as such but it is most certainly in full opposition to the location of any such service in any frequency band which would in any way interfere with or limit the use of the frequencies already assigned to the petroleum radio service."

A heavy majority of the fixed stations currently operated in the petroleum service are within the 952-960 mc, 1850-1990 mc and 6575-6875 mc bands, Mr. Keller said, and the Central Committee is accordingly "strongly opposed' 'to an FCC proposal that theater TV "might use frequencies between 5675 and 7125 mc."

Meanwhile, the motion picture industry, with its tremendous stake in television broadcasting and theater TV, has launched a strong publicity campaign through speeches and material made available to news publications. The skill of the motion picture industry in public relations, and its large resources available for a program critical to it, such as theater TV, are expected to be important factors in the forthcoming hearing.

Bell Defense Post Assignments

Assignment of two Bell System veterans of highly important responsibilities in national defense work to major positions in the System's job of supporting and contributing to the mobilization effort, and the election of both as Western Electric Co. vice presidents effective March 1, was announced by Western Electric.

George A. Landry, president of the Sandia Corp., Western Electric subsidiary operating the Sandia, N. Mex., Laboratory of the Atomic Energy Commission, was assigned to Western Electric purchasing and traffic matters. Donald A. Quarles, Bell Telephone

THIS DEPARTMENT'S PRINCIPAL SOURCE

Telecommunications Reports

Roland C. Davies, Editor
National Press Building
Washington, D. C.

Speed... Today's New Factor

in the instrument landing of aircraft

A new speed-up in instrument landings is on the way! It's due partly to improvements engineered by International Telephone and Telegraph Corporation, *originators* of the famed "ILS" system. The new factor—speed—takes effect in all four control sectors: in point-to-point flight, in the "stack" over an airport, in the actual approach, and in runway traffic on the ground. It's a part of the government's forthcoming "common all-weather system," which promises to increase the arrival-and-departure capacity of existing air terminals by as much as 50%.

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For information on instrument landing systems and other aids to air navigation, address Federal Telephone and Radio Corporation, 100 Kingsland Road, Clifton, N. J.

Laboratories vice president, who has been responsible for the Laboratories' work in connection with the Sandia Corp., was named to succeed Mr. Landry as president of the organization.

In his new assignment, Mr. Landry will succeed Western Electric vice president Douglas F. G. Eliot when the latter retires in May, and will take over responsibility then for purchasing and traffic operations.

Traffic is a highly important part of Western Electric's role as the manufacturing and supply unit of the Bell System, in getting equipment and supplies for the Bell System companies to the right place at the right time, while the significance of Western Electric purchasing activities to the overall job in meeting record-breaking demand for defense and essential civilian communication is self-evident.

Mr. Quarles' responsibilities in charge of the Laboratories' military development program, and relations with the armed forces in connection with that program, were assumed by Timothy E. Shea, the newly-elected vice president of the Laboratories.

Rare Book Is Presented To Fort Monmouth Post

The collected papers of Dr. George Ashley Campbell, great communications engineer of the Bell System, is presented to Fort Monmouth by Dr. James O. Perrine, consultant of enlisted department of the Signal School and retired vice president of the American Telephone and Telegraph Company. The rare "book" was printed in honor of Dr. Campbell's retirement after forty years of outstanding service, and will be kept in the commanding general's office. Both Doctors Campbell, now 81, and Perrine are natives of Montclair, N. J. Dr. Campbell, inventor of the electric wave filter, in addition to developing many other communications projects, is acclaimed as modern counterpart of great men in communications such as Kelvin, Maxwell, Faraday, and Henry. Left to right in photo, are shown: Col. Eugene A. Kenny, assistant chief of staff; Col. Reginald Lyman, chief of staff; Dr. Perrine; and Lt. Col. David W. Bowman, enlisted department's assistant director.

BUTTNER HEADS FED TEL LABS

Harold H. Buttner, vice president of the International Telephone & Telegraph Corp., who has had a wide background of experience in radio and electronics with the International System since 1926, has been elected president of the Federal Telecommunication Laboratories, research unit of the IT&T in Nutley, N. J.

Mr. Buttner succeeds Maj. Gen. Roger B. Colton (USA, ret.) who has been appointed deputy technical director of IT&T with headquarters at the company's headquarters in New York City.

A 1915 graduate in electrical engineering of the University of California, Mr. Buttner joined IT&T in 1926, after having served with the Western Electric Co. and the Bell Telephone Laboratories. With IT&T, he has had important responsibilities in radio and electronic projects in different parts of the world, and has been a key executive in the IT&T research organizations.

He has also represented the IT&T and has been an expert technical advisor to U.S. delegations at many of the international telecommunications and radio conferences during the past 15 years. During World War I, while serving in the Navy, he was in charge of the Naval radio station at American Samoa, and also collaborated in building the first high power radiocommunications station near Bordeaux, France.

General Colton joined the IT&T research activities in April, 1948, after having served more than 30 years in the Army Signal Corps and Army Air Force, the latter during World War II. A graduate of Yale and Massachusetts Institute of Technology, General Colton's military career included service as chief of the Signal Corps engineering and technical service and as air communications officer of the Air Technical Service Command at the Wright-Patterson Air Force Base at Dayton, Ohio.

McCarthy To FECOM

Col. John F. McCarthy formerly commanding officer Decatur Signal Depot has been transferred to the Far East Command. His address there will be as follows: Signal Section Rycom, APO 331, c/o Postmaster, San Francisco, California.

Signal Corps Civil Service Positions Open

The Signal Corps has announced civil service positions open for communications-electronics inspectors. Applications will be accepted by the executive secretary, Board of U. S. Civil Service Examiners, Signal Corps, 225 South 18th St. Philadelphia 3, Pennsylvania until the needs of the service are met. Forms may be obtained from this office or from any first or second class post office except in regional head-

quarters cities, where the forms may be obtained from the United States Civil Service Regional Office. Forms may also be obtained from the United States Civil Service Commission, Washington 25, D. C.

New Kodak Products Featured at Dealers and Finishers Convention

Several new products are being featured by the Eastman Kodak Company at this year's Master Photo Dealer and Finishers Association convention in St. Louis. Of these the largest in the Kodak exhibit is the big new roll paper dryer designed for use in photofinishing establishments. Capable of handling three strands of photographic prints as they emerge continuously from a processing machine, the new dryer literally turns out snapshots by the ward—all dried, ready for cutting and return to the picture taker.

Also for the photofinisher the company is introducing a new printer for the rapid production of 5 x 7 or 5 x 5 enlargements from amateur negatives.

In addition, a new conversion service for the owners of Kodak Album Cutters, Model 10, is being presented. This will make the roll paper cutters completely automatic in operation and may up production to 4,000 prints an hour from processed or unprocessed rolls of prints.

For photographic dealer use the company is featuring a new filter display cabinet which is expected to help boost filter sales for dealers in all parts of the country.

A new miniature roll film developing tank, for picture takers everywhere, which may be used to develop two rolls of 35mm or 828 size film simultaneously, is being introduced.

For movie makers Kodak is showing a new photo-light bar which can be used with most movie cameras to simplify indoor movie making, and a new transparent movie reel can.

Gaither Heads Evans Lab

Colonel Loren E. Gaither, SC, has been appointed director of the Evans Signal Corps Laboratory, Belmar, N. J., replacing Lt. Col. David R. Guy who has been acting director and remains as deputy director.

The new director of the Signal Corps' Evans Lab just recently returned from Europe where his last assignment had been as technical supervisor of the American Forces Network. He is a familiar figure in SIGNAL pages, having authored several top notch and widely noted articles for this publication. In addition SIGNAL's Nov-Dec 1951 issue carried a story on Col. Gaither describing his surprise musical talent as demonstrated in an all-Gaither concert performed by the Wiesbaden Symphony Orchestra in Germany last October.

Col. Gaither's previous assignment in Europe had been as chief of the communications branch, signal division, EUCOM. His World War II service included 17 months in the CBI Theater as a signal officer with the 14th Air Force.

Baker Gets I.R.E. Medal of Honor

The medal of honor of the Institute of Radio Engineers, highest honor granted by the I.R.E., was presented March 5th to Dr. W. R. G. Baker, General Electric Company vice president and general manager of the G-E electronics division at Syracuse.

The award was presented to Dr. Baker at a banquet at the Waldorf Astoria hotel, held in conjunction with the institute's annual convention.

The medal of honor, one of the nation's highest professional awards, is presented annually by the I.R.E. in recognition of distinguished service rendered through substantial and important advancement in the science and art of radio communication.

Dr. Baker was cited for his "early technical contributions to the radio transmitter art, his long sustained and effective leadership of institute and industry engineering groups, and his outstanding service to the institute."

In accepting the award, Dr. Baker noted important increases in research expenditures scheduled for 1952 for both industry and government and urged advancements in professional integrity and new methods of communicating scientific information.

He said the "dollars cannot guarantee research results even though there is belief in some circles that if one million won't give the desired result, two million will."

"If this tremendous engineering and research effort is to be directed in the areas where it is in the public interest; if a proper balance is to be maintained between fundamental and applied research; if tremendous research boondoggles are to be avoided; if we are to maintain efficient use of engineering and research talent, we have a continuing need not only for communication of scientific knowledge, but for a continuing growth and expression of professional integrity, both within and without such organizations as the Institute of Radio Enginers."

Dr. Baker said the "scientific and engineering progress is accomplished in direct ratio to the dissemination of scientific and engineering knowledge," and described professional and technical groups, panels, and committees as "one of the best methods of communication."

Previous recipients of the Institute of Radio Engineers medal of honor include: G. Marconi, radio pioneer; Lee DeForest, inventor of the vacuum tube; Dr. E. F. W. Alexanderson, General Electric engineer whose development of an alternator assured reliable long distance broadcasting; E. H. Armstrong, inventor of the frequency modulator; J. H. Dellinger, former head of U. S. Bureau of Standards and Dr. Haraden Pratt, telecommunications adviser to President Truman.

Navy Communicator Gets Award

Lt. Commander George C. Dixon, USNR, being presented with Letter of Commendation by Capt. Wilfred B. Goulett, USN, Director, Naval Communications, at the Pentagon, Feb. 25. The Letter of Commendation, with Commendation Medal Pendant and Ribbon, was awarded by Admiral T. C. Kinkaid, USN, Commander Seventh Fleet, for Cmdr. Dixon's outstanding service while attached to the Seventh Fleet, August 1944 to August 1945. Dixon was particularly commended for the initiative and judgement with which he planned and supervised the assembly of important radio stations at Leyte, Samar, and Luzon Islands, Philippine Islands. He has been on duty in the operations branch of the Naval Communications Division, Washington, D. C., since September 1949.

Avoid that last minute rush! Make your reservations NOW for

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NEWS

New Director Plans, 1808th

Major William S. Dawson has been designated director of plans and requirements for Headquarters 1808th Airways and Air Communications Service Wing. In this position he is responsible for supervision of engineering and planning, and for the obtaining of authorization for personnel and equipment for airways communications and electronic navigational aids throughout the entire Pacific and Asia, including Korea.

Maj. Dawson had been deputy director since the recent creation of the new directorate. Prior to this assignment he was commanding officer of the 1951st AACS Squadron, which provided airways facilities in Southern Honshu. He is a commercial, multi-engine pilot and has been an ardent amateur radio operator since 1934. He is vice president of the Far East Amateur Radio League, a member of the Military Amateur Radio System and of the AFCA.

Sacramento Economy Drive Now Paying Off

The old adage, "Save the pennies and the dollars will take care of themselves" has become the slogan of the Sacramento Signal Depot, (California) which is going all-out in an effort to cut expense and educate its personnel in cost-consciousness. The depot is not overlooking any practical method of economy, whether it saves pennies or thousands, and the drive already is paying off.

By discontinuing the practice of stamping routine incoming mail, with the exception of requisitions and letters, an estimated 15 man-hours a week and $1,300 a year will be saved. In another instance, an extended conveyor system was adopted to transport material directly to the paint shop, replacing a forklift. Besides freeing the forklift for other essential work, the system will save around six man-hours of forklift operations a day and about $3,987 per years.

International Business Machine cards, utilized by the thousands to account for the many Signal Corps items stored at the depot, were formerly destroyed as they became obsolete, at a rate of about one and a half tons per month. Now the old cards are sold to a dealer in San Francisco for $55 a ton, saving the depot approximately $1,000 a year.

Action is now being taken to com-

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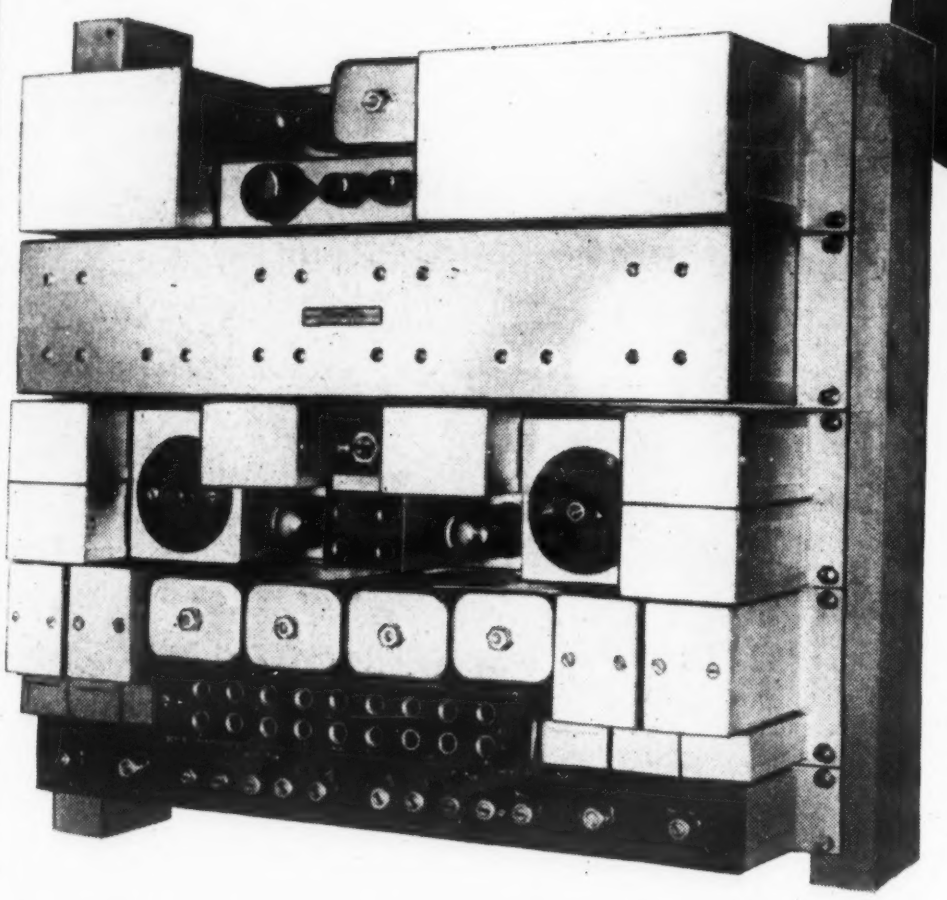

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Type of Circuit	Length of Circuit Miles	Loss at 1 KC-db
104 Copper O.W.	288	24
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All circuits are side circuits. Attenuation computed on basis of wet weather with insulators in good condition, and no large impedance discontinuities.

It isn't necessary to "get by" with transmission that is sub-standard in level or quality. Not when the condition can be corrected—so economically, effectively and simply—by installing KELLOGG Repeater. With KELLOGG Repeaters you obtain maximum usable gain, with stable balance at the highest level. A major portion of the 20 db gain of the KELLOGG Repeater is actually being realized on railroad circuits—at a fraction the cost of outside plant improvement.

This brilliant performance is made possible by the exceedingly sharp cut-off characteristics of the Kellogg filter unit above and below the 300-2700 cps voice band. Voice frequency signals in both directions in a two-wire circuit are amplified without interference between the two sides of the conversation.

KELLOGG Repeaters are highly flexible. They are assembled and wired on a unit basis to meet the needs of various types of lines and circuit applications. All usual adjustments can be made *in minutes* — with no tools other than a screw driver. Maintenance is negligible —life is measured in years and years of continuous, unfailing service.

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REPEATER

pile a cost list of common supply items used every day. This is intended to make users conscious of supply costs.

One of the principal means of making all personnel cost-conscious is instruction in the four tools of management: the suggestion program, the depot cost report, the work simplification program, and the work measurement program. A course of instruction on these subjects is given to all supervisory personnel at the depot with the intent of controlling cost by educating supervisors to apply yardsticks on their rate of production.

Perhaps the most effective method of devising efficient operations with a minimum expenditure, however, is the suggestion or work simplification program, which is particularly active at the Sacramento Signal Depot. In 1951 civilian employees suggested ideas that stand to save the installation, and the taxpayer, some $260,000,000.

Askew With X Corps

Lt. Col. Johnathan M. Askew has been named executive officer of the X Corps signal section in Korea. He previously held the same position with IX Corps, which he joined in Korea in September 1950. During World War II he served in France, Germany and Austria with XX Corps and the 11th Armored Division.

High-Speed Facsimile Meets Defense Needs, Says Redman

In Talk to AFCA Washington Group

High-Speed Facsimile which sends 3,000 words a minute or a page of 1300 words in 36 seconds offers a solution to the problem of meeting the special military and air defense needs for great speed in record communications during this present atomic age, Rear Admiral Joseph R. Redman (USN, ret.), vice president in charge of government communications of the Western Union Telegraph Co., stated in an address Feb. 6 at a meeting attended by more than 300 members of the Washington Chapter of the Armed Forces Communications Association.

Admiral Redman who was Director of Naval Communications in World War II contrasted the high-speed facsimile traffic capacity with the speed of printers—150 words per minute for high-speed printers and 65 words for standard printers. Before and after the luncheon meeting the High-Speed Facsimile, together with the Autofax and the Desk-Fax, which have been developed by Western Union, were demonstrated to the AFCA members. In addition, approximately 30 Washington press association and newspaper correspondents witnessed demonstrations of the High-Speed Fax and were understood to have been interested in its potentialities for the handling of newspaper dispatches from their Washington offices to their newspapers and in the transmission of the huge volume of traffic from major news events such as the two political conventions.

Because the United States is vulnerable to atomic attack by enemy bombers and the U. S. defending airplanes must be dispatched at a moment's notice to stop the enemy, Admiral Redman stressed that such an operation "demands the newest, fastest and most efficient type of communications we can develop." He stated that "High-Speed Facsimile offers a technique by which this can be accomplished." It is felt to be an ideal record communications facility to interconnect top military command headquarters and tactical operations centers.

"The High-Speed Fax, a product of Western Union research," Admiral Redman stated, "is one of the most revolutionary communications developments in years. It can transmit and receive over any distance any written, printed or picture material at a speed up to a faster-than-speech 3,000 words a minute." Military communications must be prepared to act with atomic speed if lives are to be saved, he emphasized. and then pointed out that present-day jet planes with 600 miles an hour speed

have a 4 to 1 step-up in speed compared with the World War II planes with 150 miles an hour speed. He posed the question of what is the use of having jet fighters and bombers with their tremendous speed if command communications lags far behind in speed.

Command centers of the Air Force, because the Air Force has such a vital tactical role in the continental United States, must have high-speed record communications links with their tactical operations centers to combat atomic attacks, Admiral Redman cited. The slow speed printers have a useful function in administrative and logistical traffic, but command communications in this atomic age, he stressed, requires the most efficient high speed facilities available. He declared that the high speed facsimile would be expensive to install but noted the World War II Norden radar bomb sight cost $8,000 compared with the greatly improved modern bomb sight costing $250,000 and weighing a ton, as now being used by the Air Force—demonstrating that modern developments were more costly.

Microwave, since the high-speed-facsimile requires a band width of 30 kc, is by far the best path for the handling of high-speed facsimile, he said, but Western Union cannot extend its microwave network for the High-Speed Fax until adequate customer demand develops because of the high cost of a comprehensive micro-wave system. He added that the 15 kc bandwidth in high quality wire lines, such as are used for broadcast program transmissions, would cut down the speed and capacity of the facsimile transmission to around 1,000 words per minute.

"The solution of the problem of meeting this special military need of high-speed facsimile record communications," Admiral Redman declared, "is to establish a system that accepts material instantly for transmission in whatever form presented, automatically relays it through a switching center with utmost dispatch, has an effective speed of transmission of over a thousand words a minute, and receives a 'picture' reproduction of the sent message, ready for immediate use." He related that short wave radio bands could be used for overseas transmission of facsimile and during World War II the Navy operated a facsimile system from Guam to the U.S. Mainland. The Western Union vice president also pointed out that high-speed facsimile would be the best medium for the most expeditious pick-up and delivery terminal handling for local record communications and it is understood that the armed services have been considering its potentialities.

At the head table of the luncheon meeting were: Haraden Pratt, telecommunications advisor to the President: FCC Chairman Wayne Coy; Rear Admiral John R. Redman, Director, Communications-Electronics, Joint Chiefs of

Staff; Maj. Gen Raymond C. Maude, Director of Air Force Communications; Brig. Gen. James D. O'Connell, Deputy Chief Signal Officer; Captain W. B. Goulett, Director, Naval Communications; Captain W. H. Beltz, assistant chief for electronics of Navy Bureau of Ships; Frederick P. Guthrie, assistant vice president of RCA Communications; and Francis H. Engel, RCA Victor Washington Manager, who was last year's AFCA Washington chapter president. Preston Shivers, Philco Washington Manager, presided at the affair. In addition, in attendance were five FCC Commissioners—Vice Chairman Paul A. Walker, Miss Freida B. Hennock, Robert F. Jones, George Sterling, and E. M. Webster. H. P. Corwith, vice president in charge of researrch and development, was the top-ranking Western Union executive at the affair.

OCSigO Assignments

Colonel Haskell H. Cleaves reported for duty.

Colonel Francis F. Uhrhane, reported for duty in the engineering and technical division. He recently returned from the Far East Command where he was with the Eighth U.S. Army and the Japan Logistical Command.

Lt. Col. Eric R. Osborne, designated Department of the Army associate member, committee on electronics, research and development board.

Captain Raymond C. Winterbottom, Signal Corps Reserve, 14 days active duty training in Army communications service division.

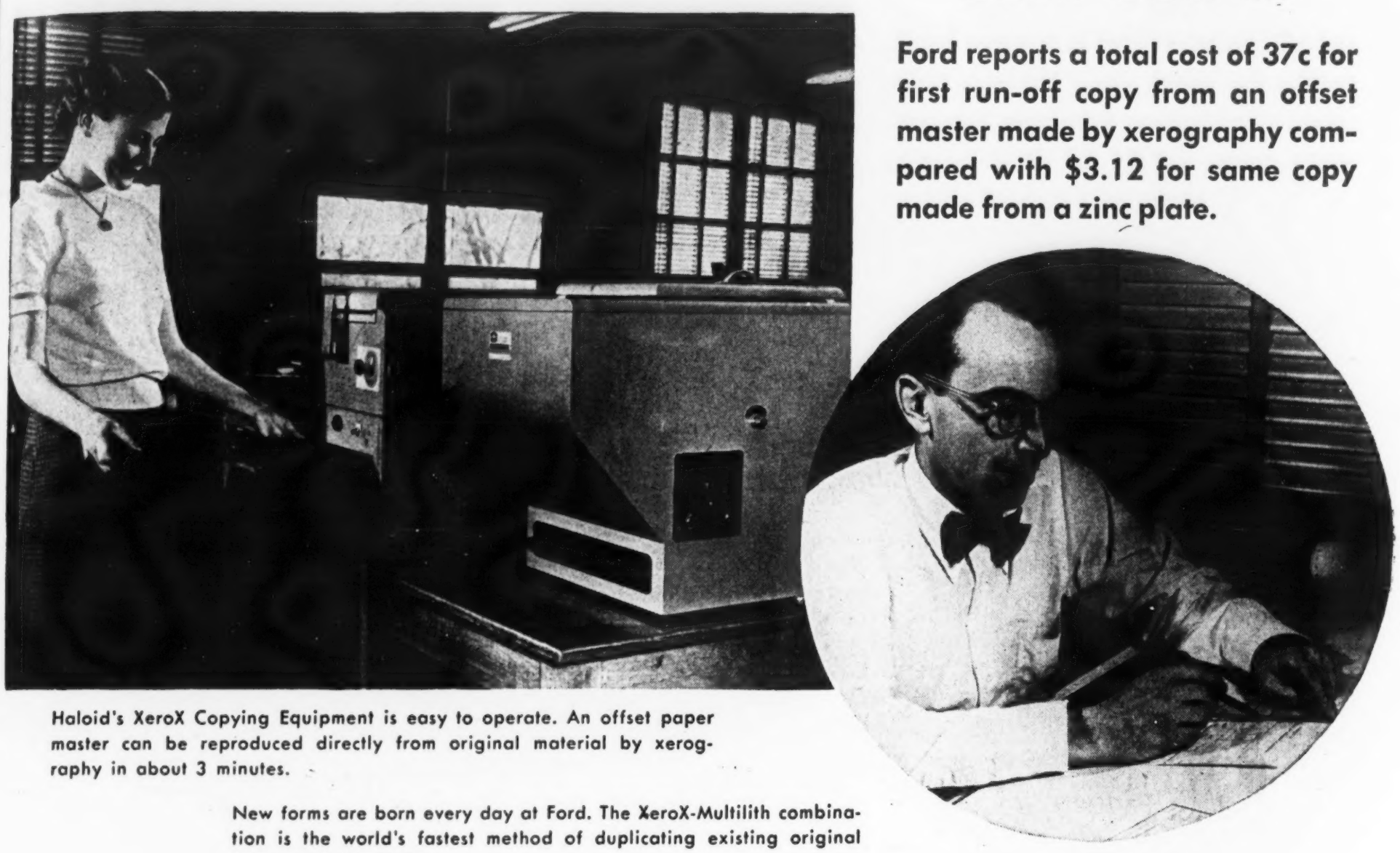
First Lieutenant Ralph K. Younger, has reported for duty in the administrative office.

AACS Personnel Changes

The following Hq. AACS personnel have been reassigned; Capt. James H. Carver, CWO James W. Bradsher and WOJG Samuel Leppo to the 1808th AACS Wing, Tokyo; Capt. Lysle E. Shields to the 1810th AACS Group, Hickam AFB; Maj. Robert E. Larson to the Allied Air Forces in Central Europe; Capt. Charles E. Irwin to the 1805th AACS Group, Newfoundland; Capt. William T. White to the 1090 USAF Special Reporting Wing, Wash., D.C.; 1st Lt. Alva E. Quint to the 1906th AACS Squadron, Hill AFB, Utah; 1st Lt. Myron I. Seamons to Hq. Atlantic Division (MATS), Westover AFB, Mass. and 2nd Lt. Odis W. Funderburk to the Third Air Force, England.

The following personnel are attending schools; Capt. August Mirzaoff, communications-electronics, Maxwell AFB, Ala.; Capt. Jack L. Mercer, aircraft maintenance, Chanute AFB, Ill., and 2nd Lt. Alois M. Palenchar, communications, Scott AFB, Ill.

FORD MOTOR COMPANY STUDY INDICATES THAT XEROGRAPHY *SPEEDS* DUPLICATING INTERNAL OFFICE FORMS... *CUTS COSTS!*



Haloid's XeroX Copying Equipment is easy to operate. An offset paper master can be reproduced directly from original material by xerography in about 3 minutes.

Ford reports a total cost of 37c for first run-off copy from an offset master made by xerography compared with $3.12 for same copy made from a zinc plate.

New forms are born every day at Ford. The XeroX-Multilith combination is the world's fastest method of duplicating existing original forms and documents.

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As part of an extensive study of all duplicating processes by the Central office of Ford Motor Company, it has been indicated that offset paper masters prepared by the xerography process instead of by conventional methods, will save time and money. In revising an office form, a test showed that from final drafting board copy to the first run off copy from an offset master is a matter of minutes at an approximate total cost of 37c, including materials, labor and overhead. This compared with a cost of $3.12 for the first copy from zinc plates which otherwise might be required. Test runs up to 20,000 have been run from one XeroX Master.

Save time, money, materials. Your existing office or factory forms, drawings, etc., can be reproduced on a paper master plate by xerography; and multiple copies can be run off on an offset process duplicator . . . *all* within three minutes.

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Messages Unlimited

(*Continued from page* 28)

sage sent or received in a large headquarters is close to 200 words. Comprehensive staff reports and long supply requisitions often run this figure into the thousands. The manual CW operator with his key can't handle this volume. His 20 or 30 word a minute is too slow. But now mobile radio teletypewriter communication is a proven fact, easy to set-up, easy to operate, and as trouble free as any equipment, a unit in the field can hope to obtain.

Battlefront

(*Continued from page* 24)

get in front of elements of Infantry. At Wonju, advance com center and construction teams were installing message equipment about 12 miles above the 2d Division command post the three above the CP of the 187th Airborne Infantry Regiment.

A 4th Signal team in the same action was attacked by a patrol of eight Chinese, who suddenly found they had tipped over a hornet's nest. The Signalmen, without casualties to themselves, killed five of the Reds, wounded one, and may have hit one or both of the enemy who managed to make a hasty escape.

When X Corps moved into North Korea, the battalion was faced with its toughest problem in history. The Corps was operating virtually as an Army, serving directly under GHQ in Tokyo and maintaining its own logistical facilities. Added to that was vast expanse of the eastern half of the peninsula, from the parallel to the Siberian-Manchurian border, in the Corps "theater."

However, the movement back into South Korea brought no let-up in battalion activity. The early part of 1951 found the 4th Signal serving as the nerve center of four command posts stretched out over 200 miles of mountainous terrain.

While fighting and maintaining communications in North Korea, the 4th Signal was nicknamed "Bell Telephone of Red Korea" by X Corps GIs. Within three days after the landing at Wonsan, Signalmen, working under constant fire, largely from guerrillas, rehabilitated and laid three telephone circuits between Wonsan and Hamhung, 92 miles to the north. In Hamhung alone, 250 miles of wire was opened by the Signalmen and 300 miles was strung between Hamhung and Hungnam, 10 miles apart.

When the Chinese surrounded the Hungnam-Hamhung perimeter, squeezing X Corps troops into a 10-mile arc, individual units were able to maintain unbroken contact with the Corps CP in Hungnam over the 1,000 miles of wire laid by the 4th Signal inside the position.

In every operation, the Signalmen reclaim as much wire as possible. Korea has never been known as a land of telephones. As a result, 75 per cent of all Army lines in the X Corps sector must be installed by the battalion's linesmen.

Because of rugged hills and lack of roads, mobile methods of installing the wire trail a poor second to strong backs. Signalmen string out the wire from railroad hand cars, trucks, jeeps—and from A-Frames, "piggy-back" and the reel system, with two Signalmen unrolling the wire from a big spool turning on an axle as they march across valleys and mountains. Over 50 per cent of all wire laid in Korea has been hand-carried.

But installing the lines is only half of the picture. "From the day we landed until the day we leave Korea, trouble teams will be out day and night 'patching' the wire," commented Capt. John N. De Sanctis. The Vineland, N. J., officer is one of the company veterans and a former Signalman with the U. S. Army in Korea during peacetime days.

Wiremen and trouble crews have worked on the lines in stretches as long as three consecutive days, operating in daylight and darkness without sleep, before relief crews could be rushed to their aid.

The enemy, whose infiltration has been a particular threat to communications, makes a daily practice of snipping the telephone lines in remote sections. Then, too, many Koreans, without realizing the importance of the thin wire link, hack out sections of the line

(*Continued on page* 74, *col.* 1)

Multiple Address Equipment

(*Continued from page* 17)

combines the maximum versatility possible with the highly-desired compactness that is necessary in the smaller installation. All maintenance with exceptions of work on the keyboards and master transmitter-distributors is performed within the bays by opening a large, full-length door at the rear of each bay. This provides reasonable access to the various units which rest, fully exposed, in metallic trays that allow sufficient space around them and over them to accommodate the more intricate maintenance procedures.

Maintenance may be performed with minimum interruption of equipment at any time. Major units such as the typing reperforators may be completely removed from the bays by disengaging plugs from jacks since these are wired to automatically close the circuit when plugs are removed. Base connecting strips are permanently mounted and wired in the bays.

In appearance the completed assembly consists of the two bays placed side by side with each flanked by its associated page printer equipment. Each bay contains four typing reperforators, one above the other, numbered one through eight consecutively, beginning at the top of the left hand bay.

The lower typing reperforator in each bay is complete with sending base (keyboard) which protrudes from the front of the bay and is within easy reach of the operator for typing address headings on tapes to be manufactured from the master text.

Directly below and slightly to the left of the keyboard on each bay is a switch panel containing four lever switch keys numbered from left to right to correspond to the numbered typing reperforators in the bays. These switches control operation of the typing reperforators with all of them out when the switches are in normal position. When the switch keys are up, all typing reperforators will operate from the transmitter-distributors or from the keyboards.

A power switch controlling power to each bay is located to the right and slightly below the keyboard. Power switches for the page printers are located in those units themselves. On the switch panel of the right hand bay an additional switch is installed for the purpose of providing interconnection between the bays by placing them in parallel. This switch is inactivated when in the normal position.

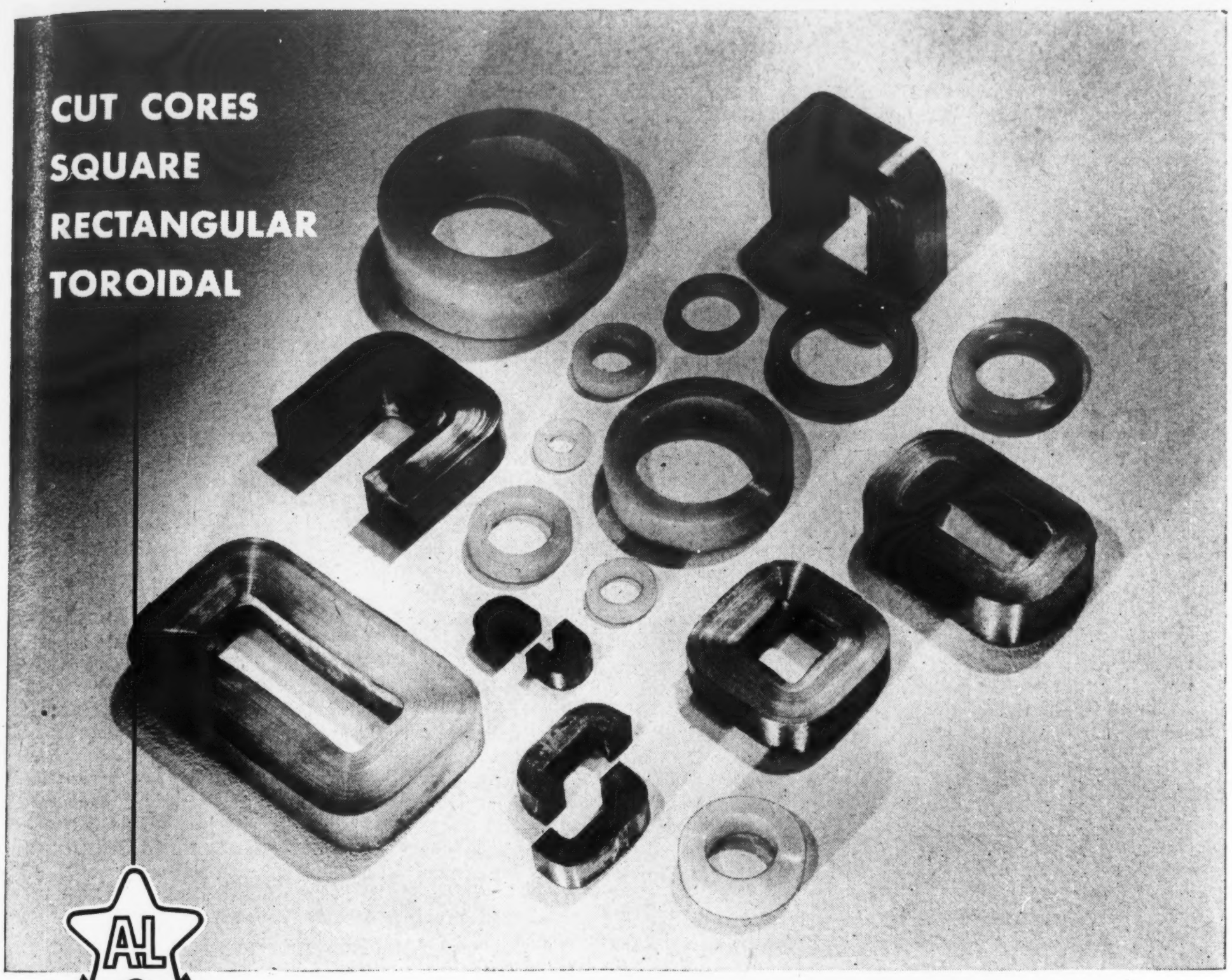
A plastic chute is provided in the plexiglass window in front of each typing reperforator which allows tape issuing from the reperforator to drop into the tape bin that forms an apron across the lower section of both bays.

The master transmitter-distributor projects from the front of each bay where it is available to the operator of the equipment.

Operation of the equipment by personnel acquainted with basic military multiple address (ZVA) procedure is extremely simple and demands nothing more complex than the ability to associate the numbered lever key switches with the correspondingly numbered typing reperforators desired. By utilizing the built-in interconnecting switching arrangement, the following functions are made possible:

a. Using it as one unit, connected in parallel by means of the tandem switch, the operator may cut eight tapes from a master tape placed in either transmitter-distributor, at the same time utilizing both page printers for monitoring purposes.

b. As two units, it will reproduce four tapes, each unit independent of the other, with a monitor page copy provided for each unit.



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Anything You May Need in TAPE-WOUND CORES

RANGE OF MATERIALS

Depending upon the specific properties required by the application, Arnold Tape-Wound Cores are available made of DELTAMAX . . . 4-79 MO-PERMALLOY . . . SUPERMALLOY . . . MUMETAL . . . 4750 ELECTRICAL METAL . . . or SELECTRON (grain-oriented silicon steel).

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Practically any size Tape-Wound Core can be supplied, from a fraction of a gram to several hundred pounds in weight. Toroidal cores are available in fifteen standard sizes with protective nylon cases. Special sizes of toroidal cores—and all cut cores, square or rectangular cores—are manufactured to meet your individual requirements.

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MAGNETIC AMPLIFIERS
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WAD 3963

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General Office & Plant: Marengo, Illinois

Motorola

(*Continued from page* 22)

ment not only to the police but to fire departments, railroads, taxi fleets, power companies, busses, forestry services, petroleum and pipe line companies, in fact to a vast variety of companies and citizens who could show the FCC a legitimate business need for 2-way radio. Motorola was now a major force in the radio and electronics world, humming with activity in not only the communications field but increasingly in car radio, home radio and now television.

Motorola fully realized that to augment the use of 2-way radio by all types of emergency users it would be essential to improve the selectivity of receivers and reduce the spurious radiation from radio transmitters. Motorola introduced double tuning in all its circuits in 1947 as a first move in this direction.

Competitors recognized that Motorola's performance was superior, during 1946 and 1947, and that Noble's squelch circuit was of great importance. They asked Motorola if they could be licensed to use that circuit. Motorola arranged a nominal licensing fee and in 1947 the major manufacturers of competitive equipment were licensed by Motorola to use the Noble squelch circuit.

This was the year Motorola marketed its first television set. It startled the industry by becoming the first manufacturer to penetrate "the $200 minimum," with a 7-inch set retailing for $189.95. It scored this "first" and a number of others then and later because Galvin had the foresight to pick his television "operational team" as early as March 1946. When production got under way, Motorola had a complete television producing unit, including research, development, production, purchasing, sales, advertising and merchandising departments. Because of this, Motorola made a profit from the very beginning, and Galvin believes his is likely the only company that did. It was really the advantage of this integrated production program that enabled Motorola to bring out its price shattering receiver.

Galvin believes that the very uncertainty of his early days in radio turned out to be a crucial advantage. "We as a company had to learn all the way. We had no sponsorship, no money, no business. The car radio idea in 1930 was very unpopular from a conservative point of view. People said, 'who wants a car radio. The idea's silly. Besides they'll ruin your motor.' For this reason, the business attracted very young men who hoped to grow up with a new industry and were willing to take a chance. When the business really got going, the enthusiasm of these young men plus our emphasis on sound engineering made an unbeatable combination."

As far as television was concerned, Motorola made its formal bid for a pace-setting position in the television industry with its "1950" line, introduced at the Waldorf-Astoria Hotel in August 1949. At a jam-packed press party, Motorola introduced 22 sets ranging from portable to large television-radio-phonograph combinations. This line, Motorola's "Twentieth Anniversary" line, was known in the trade for its introduction of eleven new inventions, electronic advances that made the Motorola sets technically of the first rank. Behind several of these inventions was the Motorola engineer, Kurt Schlesinger, noted for his work in both theoretical and applied television for twenty years, and Motorola's circuitry genius, George Fyler. Two years of research, and over a million dollars went into the development of the advances in this new line.

Galvin served notice that Motorola had the technical and manufacturing resources to stay at the top of the fiercely competitive television industry when only six months later, January 1950, it unveiled an entire new line of 19 models at the Chicago Winter Furniture Market. Motorola had now become what the trade calls one of the "Big Four" TV set producers, along with RCA, Philco and Admiral.

Several months later, on August 1, 1950, Motorola again played host to the nation's press at the Wedgwood Room of the Waldorf-Astoria, when it presented its "1951" line, a major new line of no less than 29 models. A high point of this showing was the announcement that Motorola had received the Fashion Academy Gold Medal Award for excellence in the design of its cabinetry, the first television or radio manufacturer to be so honored.

Motorola has continued to stay on top in television, bringing out new models regularly and producing in a

(*Continued on page* 76, *col.* 1)

Multiple Address Equipment

(*Continued from page* 70)

c. Used simply as a monitoring unit, it will make either one or two page copies of a tape placed in either transmitter-distributor.

d. It will print either one or two page copies on the monitor printers from the keyboard without cutting tape.

e. Keyboard and reperforating units in opposite bays may be operated while simultaneously reproducing tapes from a master tape in either transmitter-distributor.

f. Any combination of the reperforators, transmitter-distributor and page printer in one bay only may be arranged.

It is apparent from study of these possibilities that at least one combination is made available to the operator to meet any exigency that may arise in normal tape relay operations.

In ordinary circumstances the operator desiring say, five, reproductions of a single received tape makes a tandem connection of the bays then simply connects the keyboard to reperforators one through five in succession by means of the lever key switches, as well as one or both page printers; types in the appropriate heading for each new tape, then places the master tape in either transmitter-distributor and sets the whole assembly in operation by means of the power switch.

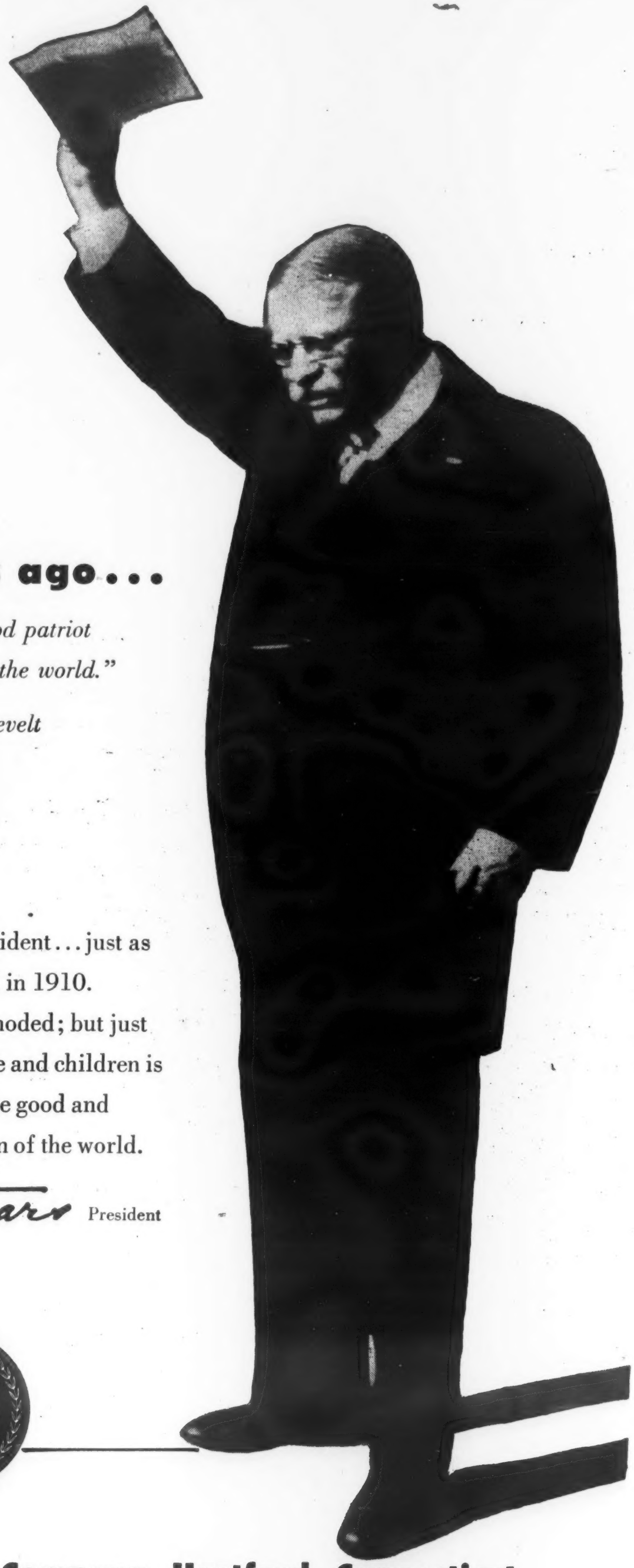
The equipment proceeds to manufacture five copies of the master tape plus either one or two printed page copies of it. This page copy is useful as a means of ascertaining whether one new tape has actually been made for each addressee required since the typed addressees as they appear on each individual tape likewise appear on the page copy. The new tapes are checked one by one against the multiple addressees listed on the original received master tape, and the corresponding address heading on the monitor page copy is encircled. It may then be retained for record as evidence that multiple address responsibilities of the station were met.

Prompt distribution of the manufactured tapes to the appropriate transmitting operators assures that each addressee receives his copy of the message at the same time as the others while the total delay involved in the whole transaction is only that time required for typing address headings and for re-running the master tape through a transmitter-distributor once.

The only serious criticism encountered after the equipment was placed in use concerned the high noise level it created when several typing reperforators were connected and operating. This fault could be remedied by insulating the interior of the bays with a sound-absorbant material since all equipment except keyboard and transmitter-distributor head is enclosed.

Ease of operation has made it possible for all personnel of the station to be trained as multiple address operators and the versatility of the equipment has provided the installation with an immeasurably valuable asset that is sturdy, simplified, demanding of little maintenance and pleasing in appearance.

A notable lack of issue of such integrated equipment in assembled form in the years that tape relay has been growing in the military communications system makes construction of a multiple address assembly a prime consideration for any relay station attempting to cope with a large traffic load and its frequent demands for multiple address message processing.



Spoken 42 years ago...

"I believe that a man must be a good patriot before he can be a good citizen of the world."

Theodore Roosevelt

...these words can guide us now

Great words, spoken by a great president... just as applicable now as when first uttered in 1910. Patriotism, to a lot of people is outmoded; but just as the man who is devoted to his wife and children is the most satisfactory neighbor, so the good and steadfast American is the best citizen of the world.

Walter E. Dituars President

The Gray Manufacturing Company, Hartford, Connecticut
makers of the Audograph Electronic Soundwriter

Battlefront

(*Continued from page* 70)

to tie up their bundles as they walk along the open roadside.

Even Brother GI is sometimes as capable of destroying communications as the Reds. Hundreds of yards of wire have been unintentionally destroyed by Americans who built fires atop ground buried lines during breaks in motor convoys.

A 4th Signal team of seven men, headed by Capt. Noble Cunningham and M/Sgt. Arvin J. Wilbert, is credited by the battalion intelligence section as being the first Americans to span the waistline of the peninsula from Pyongyang to Wonsan, 162 miles, during hostilities. They made the crossing in a small motor convoy to survey telephone lines between the North Korean capital and the east coast.

In North Korea the "Bell System" served more than 200,000 "customers" over thousands of square miles of enemy territory, with half of the telephones operated by wire and the other 50 per cent by the radio-telephone relay system. Most of the telephone communications have been similarly divided in all of the peninsula operations of the Corps.

And 75 per cent of all calls are "long distance" communications which hit an average of 50 miles. "If we could collect tolls for every long distance call we put through, every man in the battalion would be a near millionaire," Colonel Martin commented.

The Signal battalion wears the red badge of courage exceedingly well. No Infantryman looks down the bridge of his nose at the outfit, especially not since Hagaru-ri.

An advance CP communications team of 81 men and two officers was dispatched from Hamhung into the southern border area of the Chosin Reservoir to establish communications between the GIs and Marines in that area and the Corps main headquarters in the rear.

The team arrived Nov. 27, unaware that the advance Corps CP was surrounded by two full divisions of Red China's Manchurian army. As the enemy watched from the frozen hills in the distance, the Signalmen quickly set up a com center and telephone and radio communications with Hamhung.

The following night, like a huge wave washing up on a beach, an avalanche of Reds flooded down from their hilltop fastnesses, inundating the smaller forces at the CP in flush of surprise. Nine Signalmen were wounded and one was killed during the first few minutes of fighting, before the Signalmen could withdraw to a nearby ridge from which they could pour fire into the attackers. Once the Signalmen dug in, they suffered no further casualties.

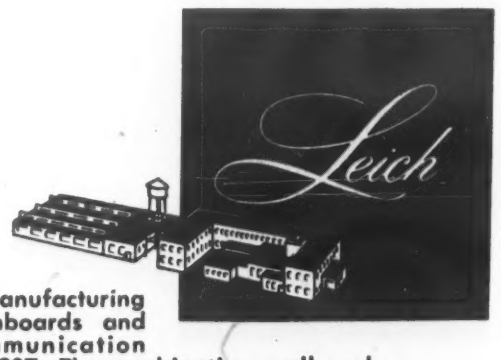
Time after time the enemy tried to

(*Continued on page* 80, *col.* 1)

simplicity wins . . .

**THE SAME LEICH TELEPHONE
THAT IS A DESK MODEL . . .
IS ALSO A WALL MODEL . . .
NO CHANGES OR ADDITIONS
NECESSARY . . .**

- Here's a simple idea that saves time, work, money and confusion for those responsible for the operation of a telephone system.
- The hookswitch levers on the Leich telephone protrude from the corner of the cradle at a 45 degree angle. In this way they operate equally well whether the telephone is set on a desk, or turned up and over and mounted on the wall.
- In other words, this one Leich telephone can be used as a wall or as a desk model, will fit every installation requirement. No changes or additions are necessary.
- With this sensible arrangement it is necessary to stock only one type of instrument. Every installation can be made with the individual user having his choice of wall or desk installation. Even when the user changes his mind, the same instrument can be used.
- This is the kind of telephone you can depend on for efficient, trouble free operation. Transmission and reception are crisp and clear, over the widest possible voice range. The Leich ringer will perform faithfully for years without requiring adjustment. The anti-side tone high frequency induction coil and hermetically sealed condenser assure excellent service.
- Tens of thousands of these Leich telephones are in service all over these United States. Users are reporting enthusiastically about their performance. Write today for our catalog which gives complete information on Leich 600 series telephones.



Leich has been manufacturing telephones, switchboards and associated communication equipment since 1907. The combination wall and desk telephone, and many other improvements in modern telephony are Leich developments.

SALES CORPORATION • 427 W. RANDOLPH ST., CHICAGO 6, ILL.

Motorola

(*Continued from page 72*)

volume that has kept it in the "Big Four" and helped substantially to increase its net sales ten times in the last ten years, with the figure last year totaling $177 million.

Its communications division also has made enormous strides. One of the basic problems facing this organization, and all other 2-way radio manufacturers, has been the limited space in the frequency spectrum. Each radio system requires a certain amount of this space, and when all of it is assigned one of three alternatives remain:

(1) 2-way radio expansion must cease altogether.

(2) A number of groups must share each 2-way radio frequency channel.

(3) Or, the art of radio must be improved so that each 2-way radio system uses less of the frequency space—ie. operates within a narrower channel.

Obviously the first expedient is neither fair nor practical. In some cases the second has had to be used when one group of 2-way radio users, notably taxicabs, outgrew its allotted space, but this certainly is not preferable.

The only real solution, Motorola has been convinced all along, is that of improvement of 2-way radio to the point that channel width be decreased to permit an increase in the number of channels.

I.D.C. or Instantaneous Deviation Control, engineered by Motorola in 1948, a development incorporated in the radio transmitter to keep the swing of the R.F. signals within their assigned channel, was a major step in this direction.

Originally the channel widths assigned for 2-way radio operation were ahead of the state of the art. Two-way radio manufacturers had not yet refined their equipment to the place where radiated power could be contained in the relatively narrow bandwidth. As a result, alternate channel assignments were made by the Federal Communications Commission with the in-between channels used as guard bands.

In 1949 the company introduced its "Research Line" of communications equipment and announced the Sensicon receiver, a milestone in the company's contribution to the communcations world.

The most profound new laboratory development incorporated into this receiver was the Permakay, a separately packaged filter containing fifteen tuned circuits adjusted at the factory and cast in a solid block of resinous material so that it is completely protected against the effects of heat, humidity and other deteriorating elements. All radio signals within the frequency bounds set by this filter will be accepted, all signals outside these bounds will be rejected.

With this remarkable unit it is not only possible for radio systems to operate on adjacent channels (which have been assigned by the FCC since July, 1949) but, by merely removing the Permakay filter and substituting another of narrower channel limits, presently assigned channels can be cut in half, or thirds, or even smaller limits to allow for even more 2-way radio systems.

Many other major advances in 2-way communications development are contained in the Sensicon receiver, including the mounting of the final RF crystal in a constant temperature, thermostatically controlled oven; an advanced design local oscillator; a revolutionary new capacitance discriminator, and the adaption of rigid tunable coaxial line tank circuits in the 152-174 mc. band transmitters.

Galvin's optimism extends to each phase of Motorola's vast operations, even to home radio, which has maintained an extraordinary volume over the years of the television boom, verifying Galvin's widely publicized prediction of 1948 that television would not mean the end of radio by any means. Naturally Galvin retains a special love for car radio, which continues to be an ever larger earner for Motorola, and his great interest in television is attested to by his continuing activity as a leading member of the RTMA, of which he is an ex-president.

But perhaps he sees in the communications field the most exciting prospects, as Motorola becomes increasingly a dominant factor in the electronics industry. Today Motorola has made and is continuing to make some of the largest private microwave radio relay systems in the world. These are very large enterprises, the most recently completed system, for the Texas-Illinois Natural Gas Pipeline Company and the Mid-Valley Pipeline Company each being over 1,000 miles long. At the same time it is constructing these mammouth installations, the company is active in an infinite number of smaller communications projects, from installing radio equipment to record and transmit data on the amount of precipitation contained in the snow packs of Far Western mountains to outfitting all diesel locomotives and the 241 cabooses of the Missouri Pacific Railroad. Increasingly the company is called upon by industrial plants, and recently it completed a large 2-way radio system for Eastman Kodak's factories in Rochester which is considered a model of the efficient application of radio to plant operation. Its equipment is being widely bought for use in civil defense, to fight fires, to help out loggers in the Northwest lumbering industry, by veterinarians, by construction crews on bridges, buildings and highways, by hospitals, by the government, even by King Farouk for use around the palace. In its new plants located in Phoenix, Arizona, the company also has several plants in Quincy, Illinois, and small labs in Rockford, Illinois, and Lakewood, New Jersey, besides its main plants in Chicago) Motorola is active in military research work on guided missiles, countermeasures, direction finders, radar search and radar beacons, pulse code modulation, and fire search.

It is also doing important work in nucleonics, in teleswitching, in digital computers, selective signalling, servomechanisms, telemetering and Gamma Ray techniques. These are enterprises that Galvin himself does not understand fully, indeed so specialized has Motorola become that no one man could possibly keep abreast of all the manifold technical work now going forward. But Galvin continues to run Motorola, there is no mistake about that, although increasingly his son, Executive Vice President Robert W. Galvin, known to everyone as simply "Bob", is taking on responsibilities that were once solely his father's.

The Galvins and the band of old timers that started with Motorola are justly proud of what their company has become. But this pride is not limited to its technical and production feats. Motorola is widely respected as one of the most liberal companies in the country, with a consistently excellent labor record and the reputation for being an exceptionally happy place to work. Wages are at or above the scale. Top executives, almost without exception, have been upgraded from the rank and file. In addition to every single one of the usual employees benefits only indulged in part by most corporations—ie. group and hospital insurance, paid vacations, cash-for-suggestions, etc.—the company has one of the finest profit-sharing programs known, a disbursement of 25% of the company's yearly net income before taxes in a deferred distribution trust plan. Other evidence: while any national manufacturer you can name provides cafeteria facilities for its workers, the Motorola cafeteria operates *below cost*—generally speaking, prices haven't changed in the past dozen years. And there is no executive dining room.

At this writing, Motorola is completing one of the most stirring years in its 23 year old history, in the forefront of the communications-television-radio industry. Its future seems unlimited, barring a world war. Against this contingency, however, Motorola is playing an ever larger role. By the end of 1952, like most of its big competitors, it will be carrying a heavy load of defense work, which, like the defense work now being taken on by companies throughout the United States, will probably act as a decisive deterrent to the only development that could possibly keep Motorola from playing a dominant role in the history of modern industry.

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	Original Resist.	1st Cycle % Chge	2nd Cycle % Chge	3rd Cycle % Chge	4th Cycle % Chge	Resist. at End of 100 hrs. load	Total % Chge	% Chge from Last Temp. Cycle to End of 100 hrs. load %	Resistance Chge at End of 100 Hrs. Load only % (no cycling)	
1	100,010	+.04	+.04	+.05	+.05	100,050	+.04	−.01	100,040	−.02
2	100,000	+.03	+.04	+.03	+.05	100,060	+.06	+.01	100,000	0
3	100,000	+.01	+.02	+.02	+.05	100,000	0	+.05	100,050	−.02
4	100,000	+.02	0	+.02	+.02	100,000	0	−.02	100,040	−.01
5	100,010	+.03	+.04	+.04	+.05	100,000	0	−.05	100,030	−.03
6	100,000	0	+.03	+.04	+.04	100,100	+.1	+.06	99,980	0
7	100,000	+.04	+.05	+.04	+.04	100,070	+.07	+.03	100,000	0
8	100,000	+.03	+.05	+.05	+.05	100,050	+.05	0	100,000	0
9	100,000	+.04	+.03	+.05	+.04	100,010	+.01	−.03	100,050	0
10	100,000	+.02	+.02	+.02	+.04	100,010	+.01	−.03	100,000	0
11	100,000	0	+.01	+.01	+.03	100,000	0	−.03		

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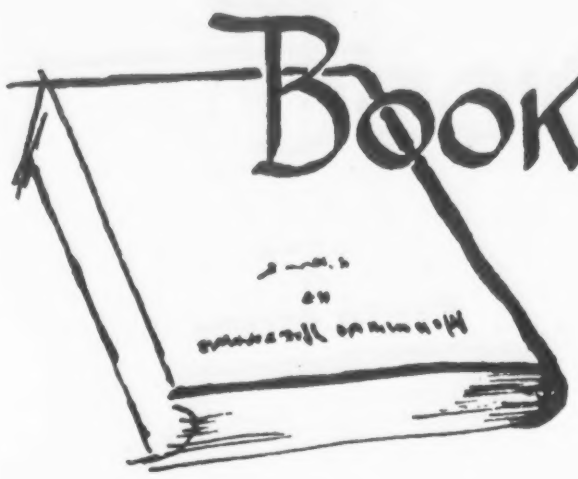

PHOTOGRAPHIC HISTORY OF WORLD WAR II. (Two of three volumes being published.) The War Against Germany: Europe and Adjacent Areas. $3.25. The War Against Germany and Italy: Mediterranean and Adjacent Areas. $3.50.

These two photographic volumes, and a third to be published, are a part of the Department of the Army's narrative history, U. S. Army in World War II. The narrative histories are well illustrated with many photographs, but of course have limitations as to the number which could be included. The subseries of pictorial volumes were therefore prepared to include in the overall history many more of the photos of World War II.

Selection of photos was made on the basis of military and historical significance. From the thousands of photographs on file, too numerous to be given general newspaper release, have been selected those that give accurate picture of warfare during the second world war. Stress is placed on those photographs depicting scenes that met the eyes of soldiers most frequently. Photographs of important terrain features of the major battlefields of the war, men in combat, types of weapons and equipment, living and weather conditions, and gigantic supply operations fill the greater portion of the volumes.

All photographs are in black and white and are accompanied by descriptive captions. Photographs of relief model maps and black and white maps are used for orientation. Each volume is divided into sections with a brief introduction giving a general background of the major events of the war. The photos within each section are arranged in chronological order to increase their value as reference works.

Included in the Mediterranean volume are sections devoted to North Africa, The Middle East, Sicily, Corsica, Sardinia, Italy, and Southern France. A variety of wartime settings is presented in this volume since it covers fighting in the desert, on the beaches, in mud, and over the mountains.

In the European volume are sections on the build-up in the United Kingdom, the air offensive, and the campaigns in Normandy, Northern France, Rhineland, Ardennes-Alsace, and Central Europe. Throughout this volume the tremendous task of transporting armies and their supplies and equipment to the continent is sharply defined by the photos selected.

WINSTON CHURCHILL, 1874-1951. By Lewis Broad. Philosophical Library. 611 pages. $6.

The courage and resolution of . . . Churchill, who made himself useful at a critical moment," was a phrase included in a dispatch from the field when Winston Churchill was a young lieutenant in the Hussars. The incident which earned young Winston the mention in the dispatch occurred in India where the Pathan tribesmen in the Mahmoud Valley were staging a revolt. During one action a British officer had been shot and a tribesman was slashing away with his sword at his prostrate figure. Young Churchill rode alone into the enemy amidst a continuous fusillade and drove off the swordsman.

During the next fifty years there were many occasions, related in the Broad biography, in which Winston Churchill with courage and resolution "made himself useful at a critical moment."

This third edition of Mr. Broad's biography of Churchill has been brought up to include events to the opening of 1951. The biography was first published in 1941, and the second edition, brought out in 1945, covered the Churchill career up until the famed statesman was retired from office by the electorate in that year.

Though out of office in the post-World War II years, Churchill's influence on the course of history continued in effect, and his exertions in that period had results typical of the importance and color of his previous achievements. The relating of his activities in that space of time make a substantial addition to the Broad biography.

The fabulous Churchill career would require several volumes to give anything like adequate coverage to it. In one volume, Mr. Broad's work probably could not be bettered. He begins at the very beginning of Winston Churchill's life and takes you through all of the fascinating highlights of one of the greatest of all careers among mankind.

THE RECORDING AND REPRODUCTION OF SOUND. By Oliver Read. Howard W. Sams & Co., Inc. 790 pages. $7.95.

The recording and reproduction of sound is a complex subject embracing many methods and techniques. New developments are increasing practical applications for sound reinforcement, and magnetic recording units have proved their capabilities for use in the studio, in the home and in commerce. Microgroove records are contributing better music at lower cost to the masses. Magnetic pickups of the variable reluctance type have proved their worth and new reproducers offer true fidelity reproduction.

Mr. Read's book has been written to cover, in a single volume, all the essential requirements for a complete understanding of all currently employed systems and to include specific data on the components that determine the final result. The text includes an abundance of information for those primarily interested in getting the finest possible reproduction from all forms of recorded media. Complete systems are included and a wide choice of amplifiers is presented so that the reader may make his own selection to suit his own particular requirements. The book has been written at semi-technical or non-technical level, wherever possible, and a practical viewpoint has been taken in presenting the material.

The author, Oliver Read, who is editor of Radio & Television News and Radio-Electronic Engineering, is well known to the Armed Force Communications Association membership, having headed the AFCA Chicago Chapter in 1951 when the Association's national convention was held in that city. He is also a member of the IRE, the SMPTE and other professional groups, and has authored many articles on recording and reproduction.

RADAR AND ELECTRONIC NAVIGATION. By G. J. Sonnenberg. D. Van Nostrand Company, Inc. 272 pages. $6.

The growth of electronic radiolocation systems, during and since World War II, has been dramatic. Few scientific or industrial developments have ever before expanded so rapidly, or found practical application so quickly and on so large a scale. This book aims at filling the definite need for comprehensive information on their use in modern navigation. It deals with the practical aspects of the operation of radar, loran, decca, and consol systems, and echo sounding.

The book's emphasis is on those factors of operation and interpretation which are of practical use and importance to the navigator. Sufficient theory is included, however, in the general in-

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troductory chapter and throughout the descriptions of the systems, for a clear understanding of their principles. Photographs and diagrams not only explain these principles clearly to the navigator, but also show him exactly what he may expect to see on the indicator of his apparatus.

ELECTRICAL MEASUREMENTS. By Forest K. Harris. John Wiley & Sons, Inc. 784 pages. $8.

This volume covers all necessary material from basic principles to applications within the field of d-c and low-frequency applications. The author discusses the origins, relations, and dimensions of electrical units; he then systematically presents basic instrument theory, starting with the study of the galvanometer. The publishers state that this study includes material which has never appeared in print before.

Dr. Harris examines each subject in such a way as to give the reader a good working knowledge of the methods and apparatus used in measurements. He places particular stress on the suitability of specific techniques and instruments for laboratory work and points out the precautions to take to ensure work of good quality, the limitations of various techniques, and the errors to expect when using common types of measuring instruments.

The book offers a thorough, well-balanced authoritative treatment which clearly shows how best to obtain the required degree of accuracy or repeatability in the job at hand.

THE TRANSPORTATION CORPS: Responsibilities, Organization, Operations. By Chester Wardlow. Office of the Chief of Military History. 454 pages. $3.25.

Actually the first really global war, the second world war, involved transportation operations which made the logistics problems of any previous war look like small stuff. Many a thoughtful man, overseas during World War II, looked at equipment and supplies piled up over a vast area and marvelled at the accomplishment of transporting all that materiel from the U. S.

The problems and the operations of this gigantic transportation epic are being described in three volumes of the official history of the U. S. Army In World War II. This, the first of the three, is mainly concerned with the establishment of the Transportation Corps in July 1942, with its organizational make-up, and with its relation to other transportation agencies, both military and civilian. Especially interesting chapters deal with the ports of embarkation and other field establishments of the Corps, with the critical role of ocean shipping, and with the utilization of domestic carriers, particularly railroads and motor transport.

NATIONAL BEST SELLERS

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The association insignia in several beautiful designs and convenient styles authorized for wear by members is availabl at the prices quoted below. Order from AFCA Service Department, 1624 Eye St., N. W., Washington 6, D. C. The insignia is described as follows:

The central figure is an alert powerful American eagle with strong talons clutching lightning flashes—symbolic of a strong America and national defense—especially insofar as modern communications is concerned. The border consists of leaves of the olive branch of peace, indicating that the object of preparedness in America is to assure a lasting peace. In the background are signal flags—the first means of signalling in sea and land warfare. Above the eagle and between his outstretched wings is a bomber in flight, symbolizing the complicated and essential communications. Above that is a radar antenna array, and at the very top a radio relay antenna —for the latest major step in communications.

Members should take every opportunity to display AFCA insignia. Worn on the uniform or civilian dress, or displayed on home or office wall, it carries with it an identification of distinction, is decorative, and helps to widen the scope of our Association by bringing it to the attention of others. Emblem is available in a variety of attractive forms.

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Wrought on the medal in sharp and bold relief is the AFCA insignia. 1⅜ inches in diameter (shown at the right, actual size), the medal is suspended from a ribbon of heavy grosgrain silk in orange and dark blue. The medal is authorized for wear on the uniform as provided in A.R. 600-40, paragraph 68g and 70c (2) (dated 31 March 1944). Prices: $3 in bronze, $4 in silver, $5 in gold. Medal is not available for sale to student members.

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take the hill from the small handfull of Signalmen; and the little knoll ran red with blood as the battalion's advance crew poured fire from burp guns, machineguns and rifles into the assault force.

But even in the heat of battle, the lines of communications were held open. The Corps general staff kept tab of battle as if it were on the scene. A 2½-ton radio truck had been driven up onto the hill and at no time were communications broken..

The next day the Signalmen withdrew from the hill to consolidate their meager forces with a company of Marines on a knoll which would go down in Marine history as "Communications Hill" in tribute to the 4th signal.

For nine days the Signalmen and Marines fought from the top of the hill until Task Force Dog, a reinforcement party, battled its way through heavy Red forces to form a link-up with the beleaguered warriors.

Eight radio operators from the 4th Signal drew high praise from General Almond for maintaining communications along the battle route of Task Force Dog under never-ending enemy fire. In teams of two each, and covered by a company of Infantry, the radiomen established a radio link service at the site of four enemy roadblocks, reporting on the progress of the line of reinforcements.

The Reds, realizing the vital mission of the radio relay team, concentrated on knocking out the communications force, but their efforts were repulsed each time.

But the work of the signal battalion is more than communications. There must also be a supply dump of additional equipment, wire, spare parts and other signal media. There is a radio repair shop which maintains all such equipment in the Corps area in a high state of efficiency.

There is a medical and dental detachment of 25 men and a mess crew which serves, according to men of other units, "the best chow in this whole country of Korea." The mess crew fights an unending battle to keep outsiders from "visiting" at chowtime. And an outsider who gets his messgear filled is indeed a privileged man, and brags thusly among his own comrades later.

The photo section maintains a picture chronicle of the conflict, both for immediate use in newspapers and magazines and for the future history books of generations yet unborn. Much of the Korean film in newsreels shown in American theaters is photographed by 4th Signal motion picture cameramen, and some of the best newspaper combat photography—troops and guns in action—is likewise recorded by 4th Signalmen.

The battalion even has its own "air force"—two light planes which make up the "Short and Sharp Air Freight Lines," named for the pilots, Captains Claud Short and William R. Sharp, Sr., two North Carolinians. Both of the airmen have flown more than 150 missions each over both friendly and enemy territory and have come under light arm fire "so many times we've just quit trying to keep account of it," one of them said.

The "air force" has the responsibility of courier service, principally, but also ferries equipment, food, ammunition and wounded men, when the occasion demands, and maintains reconnaissance of telephone lines operated by the 4th Signal.

X Corps signal chief, Col. Alfred Marcy, in summing up activities of the 4th Signal during its first six months in Korea, said: "The individual account of experiences of this great communications organization has written one of the finest chapters in Signal Corps history. Their one major objective was service to combat troops. They more than met this test."

A lot of GIs will maintain even this is an understatement.

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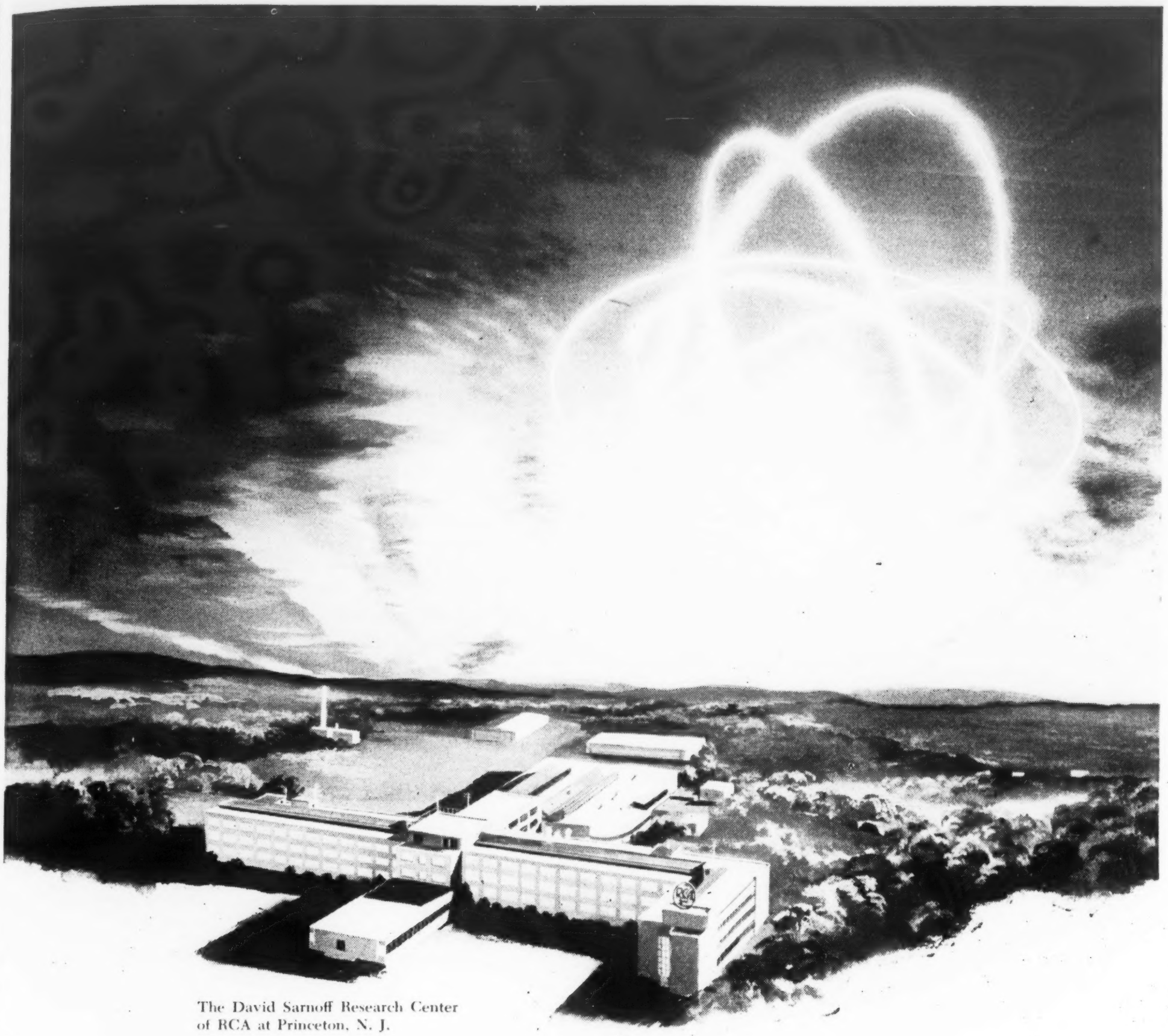

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